Online Supplement to QTest

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1 Random preference models and convex polytopes

Consider the example of Gambles A, C, D once again. Consider the possibility that the decision maker, at any point in time, rank orders the gambles according to some criterion, from best to worst. However, the ranking is uncertain and/or allowed to vary. *Mixture*, aka, *random preference* models quantify this variability with a probability distribution over preference patterns such as, in this case, rankings. Figure 1 builds up some basic intuitions with a few examples. We have already seen that the vertex ACD at coordinates (1,1,1) represents the deterministic ranking ACD because a person with preference ACD who never makes an error and never wavers in his preference would choose A over C with probability 1, A over D with probability 1, and C over D with probability 1. Likewise DCA at coordinates (0,0,0) represents the deterministic ranking DCA where a person never chooses A over C, never chooses A over D and never chooses C over D. What are the binary choice probabilities if a person's preferences fluctuate or if the person is uncertain about their preference ranking? For instance, suppose that a decision maker has preference ACD two-thirds of the time, and DCA one-third of the time, never makes an error and always chooses what they currently prefer.

Then, at randomly determined time points, this person will choose, A over C with probability $\frac{2}{3}$, A over D with probability $\frac{2}{3}$, and C over D with probability $\frac{2}{3}$. In other words, this person's binary choice probabilities form the point $(\frac{2}{3}, \frac{2}{3}, \frac{2}{3})$ marked by a star in the upper left display of Figure 1. This point lies on the line segment connecting the vertex ACD with the vertex DCA. The upper right panel in Figure 1 shows a few other points on that line segment. Each of these points can represent a person who chooses consistently with ACD some of the time, and consistently with DCA the rest of the time. The lower left of Figure 1 shows a highlighted square that connects the rankings ACD, ADC, DCA, and CDA. Each point belonging to this square has coordinates that reflect the binary choice probabilities of a person who has a probability distribution over the preference states ACD, ADC, DCA, and CDA. Likewise, all binary choice probabilities that are consistent with probability distributions over the three rankings ACD, DAC, and CDA form the triangle in the lower right of Figure 1. In general, if a person satisfies a random preference model over preference states $S_1, S_2, \ldots S_k$, then the associated binary choice probabilities must lie in the *convex hull* of the vertices representing preference states $S_1, S_2, \ldots S_k$ (i.e., in the 'space inbetween

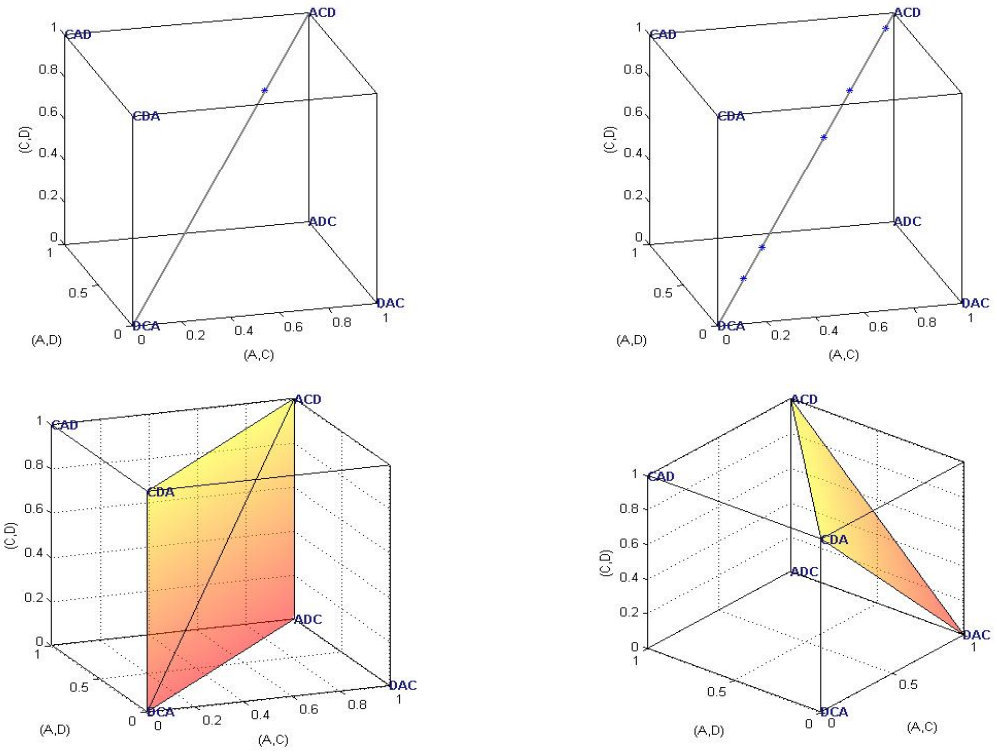

Figure 1: Random preference models. The upper left shows choice probabilities $\left(\frac{2}{3}, \frac{2}{3}, \frac{2}{3}\right)$ for someone who has preference ACD $\frac{2}{3}$ of the time and DCA otherwise. The upper right shows five sets of binary choice probabilities consistent with probability distributions on preferences ACD and DCA. The line segment connecting the two vertices shows all possible such binary choice probabilities. The lower left shows a square connecting vertices ACD, ADC, DCA, and CDA. Every point in this square has coordinates that form binary choice probabilities consistent with a probability distribution over the preference states ACD, ADC, DCA, and CDA. The lower right shows a triangle forming the corresponding "convex hull" of preference states ACD, DAC, and CDA.

those vertices'). The convex hull of ACD and DCA in the upper part of Figure 1 forms a line segment, the convex hull of vertices ACD, ADC, DCA, and CDA forms a square in the lower left of Figure 1, the convex hull of ACD, DAC, and CDA forms a triangle on the lower right of Figure 1.

In general, the convex hull of a finite collection of vertices forms a geometric object that generalizes the line, square and triangle. This object is called a *convex polytope*. All mixture (aka random preference) models form convex polytopes, with the vertices of each polytope forming the permissible preference states in the model. Each polytope can be viewed either as the convex hull of its vertices, or as the space between its flat surfaces of maximal dimension, called the *facets*. Polytopes can have different dimensions. The line segment in the upper panels of Figure 1 is a one-dimensional polytope, and its facets are the two vertices ACD and DCA. The square forms a two-dimensional polytope, and its facets are the four line segments that form the square's four sides. The triangle is a two-dimensional polytope, and its facets are the three line segments that form its three sides. Figure 2 shows a three-dimensional polytope, whose eight facets are triangles.

The data we consider in this paper stem from the first published full-fledged quantitative statistical test of such a polytope. Regenwetter et al. (2010) and Regenwetter et al. (2011a) considered

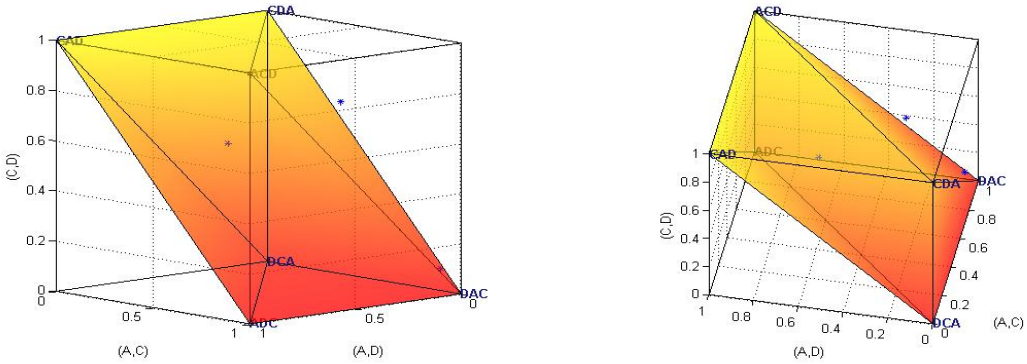

Figure 2: Two different angles of view of the same 3-D linear ordering polytope forming the convex hull of the 6 vertices representing rankings ACD, ADC, CAD, CDA, DAC, DCA. Every point in the polytope has coordinates representing binary choice probabilities consistent with a probability distribution over the 6 rankings.

the collection of all complete rankings (linear orders) of the lotteries in Cash I, Cash II, as well as a NonCash gamble set, and showed that the data are consistent with a random preference model of 120 linear order preferences, i.e., that so-called "linear ordering polytope," hence, that the data are consistent with variable rankings. Regenwetter et al. (2011b) tested a random preference model of lexicographic heuristics. They, e.g., rejected a polytope with 104 intransitive lexicographic semiorder vertices on 15 of 18 participants on Cash I and Cash II. Regenwetter and Davis-Stober (2012) went further and, using different experimental data, tested a random preference model of weak order preferences (rankings with the possibility of ties) and a very general model of "random utilities." Their model was characterized by more than 75,000 nonredundant inequalities and fit their data extraordinarily well. All three papers used the earlier versions of the internal MATLAB© code underlying QTest.

2 Dimensionality requirement, iid assumptions, sample size, conditions for data pooling, and model complexity/selection.

Dimensionality: QTest only tests models that are full-dimensional in the sample space under consideration. Distance-based specifications are automatically full-dimensional. However, as we have seen above, convex polytopes representing random preference or random utility models can be lower dimensional. In that case, even if the scholar can provide a complete description of the polytope, QTest cannot provide a statistical test, because the required classical ("frequentist") order-constrained inference is unavailable.

Independence and Identical Distribution (iid): QTest makes a number of statistical assumptions about the data generating process that are standard in maximum likelihood estimation and testing. The statistical analysis in QTest treats n repeated choices among the same pair of objects as a Binomial with n repetitions, hence it assumes that repeated choices are made statistically independently and share the same binary choice probability. QTest also treats binary choices among multiple pairs of choice alternatives as products of such Binomials. These assumptions are standard in the literature, e.g., in econometric analyses.

Sample size: As a general rule of thumb, it is recommended to have 20 or more observations when estimating a Binomial parameter in order to achieve asymptotic distributions for the likelihood test statistic.

More on Identical Distribution: There are also several special features of order-constrained inference that allow one to relax some assumptions. When the model under consideration is convex (e.g., a modal choice specification of a theory with a single predicted preference pattern, or a random preference model) then it also holds that averaging multiple sets of choice probabilities that satisfy the given model will give choice probabilities that, likewise, satisfy that model. For example, in the models shown in Figures 1 and 2, any weighted average of points in one of the convex polytopes will yield a point also in that convex polytope. In other words, for convex models it is not critical that binary choice probabilities remain constant across multiple observations. This means also that convex models permit data pooling across respondents, since the convex combination of their probabilities will still be within the region defined by the model. This lends the analysis of convex models the potential for extremely high statistical power when evaluating the Null Hypothesis that all individuals satisfy the same convex model.

Birnbaum (2012, 2011) raised several questions about the Cash I data of Regenwetter et al. (2010, 2011a) that we used for illustration. In particular, he inferred that the data do not form an iid sample, an inference that Cha et al. (2013) portrayed as lacking a compelling mathematical and statistical foundation (see also Regenwetter et al. 2011b, for related discussions). Cha et al. (2013) found the Cash I and Cash II data to pass a test of iid by Smith and Batchelder (2008) within standard Type I error rate, i.e., with fewer than 5% significant violations.

Model complexity and model selection: The current version of QTest takes a classical ("frequentist") statistics approach to model evaluation. It carries out a likelihood-ratio test, in which a model under consideration forms a Null Hypothesis whose likelihood is compared against that of an unconstrained model. The test then either rejects or fails to reject ('retains') the model under consideration.

In the manuscript, we have shown that the common heuristic of counting parameters in a model may not be an appropriate way to evaluate the complexity (flexibility) of a model. This problem is not unique to the models in QTest: It is well known that, even in 'standard' model tests, there is oftentimes the potential that the scholar could rewrite (reparametrize) a given probability model in a way that reduces the number of parameters it really needs.

In fact, determining the number of parameters one wants to use in a model is only part of a far more general, and conceptually difficult, question of complexity. Suppose that a scholar wishes to test an algebraic theory empirically. The scholar will have to make a number of decisions, such as

1. which stimuli to use,
2. how abstract a version of the theory to test,
3. which functional form to use if the version of the theory involves, say specific 'utility' or 'weighting,' functions,
4. which probabilistic specification to use,
5. what bounds to put on allowable error rates if using a distance-based specification,
6. which distance function to use for specifying the error constraints.

At every step, the scholar makes decisions that affect the complexity, i.e., flexibility, of the theoretical predictions: each of these steps affects how easily data can accommodate the resulting model.

Scholars interested in very broad triage of theories like to test axioms that separate huge classes of theories. This is particularly useful for discarding contenders that hold little promise. Rejecting a model that occupies 'much or nearly all' of the hypercube of choice probabilities (and, likewise, 'much or nearly all' of potential alternative such hypercubes that would result from different stimuli) is useful. Other scholars, interested in predicting behavior very precisely, like to zoom in on highly specific functional forms and highly specific probabilistic specifications. This is particularly useful when the resulting predictions are accurate. Retaining a model that occupies extremely 'little' of the probability cube (and 'little' of potential other such cubes that would result from different stimuli) is also very useful.

From the point of view of our geometric representation, the choice of stimuli determines the geometric space (coordinate system) that the predictions live in and it affects the 'complexity' of our predictions. 'Undiagnostic' stimuli allow for extremely complex, i.e., extremely flexible, predictions, for example. In addition to the stimulus selection, the choice of a theory version and a functional form has huge implications on the number and specifics of permissible preference patterns, hence on the number and location of the vertices we consider. This, in turn affects the locations of the hypercubes in, say, a supermajority specification, or the shape and volume of the convex polytope for a random preference model. In distance-based specifications, the choice of error bounds and distance measures will very strongly affect both the shape and volumes of the probabilistic specification in the unit hypercube of binary choice probabilities and hence the pressure (or lack thereof) that the predictions exert on the underlying theory.

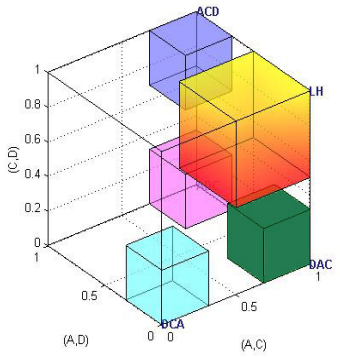

Figure 3: Volume matching between $\mathcal{CPT} - \mathcal{KT}$ and $\mathcal{LH}$ with a supermajority level for $\mathcal{CPT} - \mathcal{KT}$ chosen so that the total volume of $\mathcal{CPT} - \mathcal{KT}$ matches the volume of $\mathcal{LH}$ with a modal choice specification.

One way of summarizing these choices is to say that the scholar makes a number of decisions about how to *create experiment specific model complexity* in the design of a theory, of its probabilistic specification, and of an experiment. There are a number of methods for *accounting for model complexity* after a model has been specified, most notably Bayes factors (e.g., Klugkist and Hoijtink 2007) or Deviance Information Criterion (DIC) values (Myung et al. 2005), and normalized maximum likelihood (Davis-Stober and Brown 2011). However, these methods presume that one has already made all of the above six decisions on how exactly to create that complexity.

We believe that there many open questions as to whether there can be a principled approach

to creating such complexity. In particular, for a given set of algebraic theories, it is interesting to ask whether there could be ways to select stimuli and probabilistic specifications that will somehow 'place the competing theories on an equal footing.' We briefly sketch some preliminary ideas for distance-based specifications of $\mathcal{CPT} - \mathcal{KT}$ and $\mathcal{LH}$.

We explore two simple ideas, easily implemented in QTEST. A potential approach would be to consider probabilistic specifications of $\mathcal{CPT} - \mathcal{KT}$ and $\mathcal{LH}$ that give both theories the same total volume in the probability cube, in hopes of creating a comparable level of complexity as proxies by volume. In Figure 3 we considered the modal/majority specification of $\mathcal{LH}$ and then we adjusted the supermajority specification of $\mathcal{CPT} - \mathcal{KT}$ in such a way that the total volume of the four cubes for $\mathcal{CPT} - \mathcal{KT}$ exactly matched the volume of $\mathcal{LH}$ (QTEST can automate this). In this 3D case, the volume of the modal choice specification for $\mathcal{LH}$ is $\frac{1}{8}$, so we chose the supermajority level for ACD, ADC, DAC, and DCA so that each of those shaded cubes has a volume of $\frac{1}{4} \times \frac{1}{8} = \frac{1}{32}$. In a model like this, $\mathcal{CPT} - \mathcal{KT}$ and $\mathcal{LH}$ are given the same amount of 'space' in the probability cube. We are not aware of theoretical results that would provide an axiomatic or otherwise systematic underpinning, beyond intuition, for this approach.

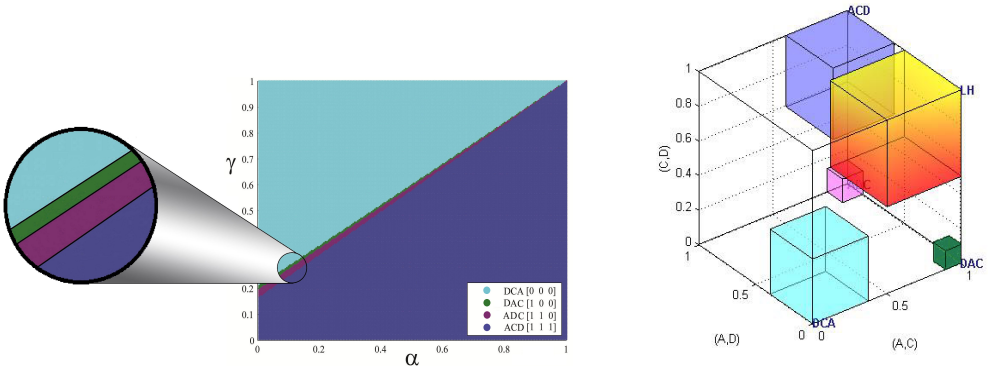

Figure 4: Volume matching $\mathcal{CPT} - \mathcal{KT}$ and $\mathcal{LH}$ by adjusting the supermajority level for each pattern of $\mathcal{CPT} - \mathcal{KT}$ to reflect the number of ways a preference relation can be generated. The left display shows the algebraic parameter space and colors the ranges that lead to the four different predicted patterns. The volumes of the supermajority cubes in the right hand display are proportional to the areas of the same color in the left display.

Figure 4 pushes the same idea further in that it gives both theories the same volume but it does not treat all rankings permitted under $\mathcal{CPT} - \mathcal{KT}$ as equal. Indeed, it is much 'harder' to find a weighting and a utility function that generate the ranking DAC (shown in green) than it is to create the ranking ACD (shown in dark blue). The left side of Figure 4 shows the regions of the algebraic parameter space that correspond to the four preference patterns, with the horizontal axis giving the curvature parameter α of the "power" utility function and the vertical axis giving the parameter γ for the "Kahneman-Tversky" weighting function (the precision and range of our grid search were $\alpha, \gamma \in [0.01, 1]$, with a step size 0.01.). The right side of Figure 4 translates this into corresponding 'matching' volumes for the supermajority specifications of the four rankings. The supermajority cube of ranking ACD has a volume equalling 57% of $\frac{1}{8}$, whereas the supermajority cube of ranking DAC has only 1% of $\frac{1}{8}$.

Figures 3 and 4 are only exploratory ideas of how one might create complexity in the design of a distance-based specification in a case where the stimuli and type of probabilistic specification have already been selected. However, just like the reparametrization of a theory can upend the

calculus of the number of parameters used by the model, so could reparametrization upend the volume matching in Figure 4. We believe that the principled design and creation of complexity is an important question in testing theories of decision making. Neither the manuscript nor the QTEST software, nor the literature on testing theories of decision making, answer that important question satisfactorily at this time.

We now provide the full lists of *facet-defining inequalities* for Random $\mathcal{CPT} - \mathcal{KT}$ and Random $\mathcal{CPT} - \mathcal{GE}$ on Cash I and Cash II. Each of these lists is a *minimal description*, which means it is a complete, nonredundant (and shortest possible) list of inequalities that fully characterize the probabilistic model in question.

3 Facet-defining inequalities for Cash I, Random $\mathcal{CPT} - \mathcal{KT}$

$1-20)$ $0 \leq P_{ij} \leq 1$, for all distinct i and j in the set of lotteries $\{a, b, c, d, e\}$.

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21) & -P_{ab} & & -P_{ae} & +P_{bc} & & & & & & & \leq 0 \\
22) & -P_{ab} & & & & & & & & +P_{ce} & -P_{de} & \leq 0 \\
23) & -P_{ab} & & & & & & +P_{cd} & -P_{ce} & & & \leq 0 \\
24) & -P_{ab} & & & & & & +P_{cd} & & -P_{de} & & \leq 0 \\
25) & -P_{ab} & & & & & +P_{be} & -P_{cd} & & & & \leq 0 \\
26) & -P_{ab} & & & & & +P_{be} & & -P_{ce} & & & \leq 0 \\
27) & -P_{ab} & & & & & +P_{be} & & & -P_{de} & & \leq 0 \\
28) & -P_{ab} & & & & +P_{bd} & -P_{be} & & & & & \leq 0 \\
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48) & -P_{ab} & +P_{ad} & & & & & & & -P_{de} & & \leq 0 \\
49) & -P_{ab} + P_{ac} & -P_{ad} & & & & & & & & & \leq 0 \\
50) & -P_{ab} + P_{ac} & & -P_{ae} & & & & & & & & \leq 0 \\
51) & -P_{ab} + P_{ac} & & & -P_{bc} & & & & & & & \leq 0 \\
52) & -P_{ab} + P_{ac} & & & & -P_{bd} & & & & & & \leq 0
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125) & & & & -P_{bd} +P_{be} & & & -P_{de} & & \leq 0 \\
126) & & & & & -P_{be} & +P_{ce} & -P_{de} & & \leq 0 \\
127) & & & & & & -P_{cd} +P_{ce} & -P_{de} & & \leq 0 \\
128) & & P_{ae} -P_{bc} -P_{bd} & & & & & & & \leq 0 \\
129) & & P_{ae} -P_{bc} & & -P_{be} & & & & & \leq 0 \\
130) & & P_{ae} -P_{bc} & & & -P_{cd} & & & & \leq 0 \\
131) & & P_{ae} -P_{bc} & & & & -P_{ce} & & & \leq 0 \\
132) & & P_{ae} -P_{bc} & & & & & -P_{de} & & \leq 0 \\
133) & -P_{ab} & -P_{ae} +P_{bc} & & & & +P_{ce} & -P_{de} & & \leq 0 \\
134) & -P_{ab} & -P_{ae} +P_{bc} & & & +P_{cd} & -P_{ce} & & & \leq 0 \\
135) & -P_{ab} & -P_{ae} +P_{bc} & & & +P_{cd} & & -P_{de} & & \leq 0 \\
136) & -P_{ab} & -P_{ae} +P_{bc} & & +P_{be} & -P_{cd} & & & & \leq 0 \\
137) & -P_{ab} & -P_{ae} +P_{bc} & & +P_{be} & & -P_{ce} & & & \leq 0 \\
138) & -P_{ab} & -P_{ae} +P_{bc} & & +P_{be} & & & -P_{de} & & \leq 0 \\
139) & -P_{ab} & -P_{ae} +P_{bc} +P_{bd} & -P_{be} & & & & & & \leq 0 \\
140) & -P_{ab} & -P_{ae} +P_{bc} +P_{bd} & & -P_{cd} & & & & & \leq 0 \\
141) & -P_{ab} & -P_{ae} +P_{bc} +P_{bd} & & & & -P_{ce} & & & \leq 0 \\
142) & -P_{ab} & -P_{ae} +P_{bc} +P_{bd} & & & & & -P_{de} & & \leq 0 \\
143) & -P_{ab} & & & +P_{be} & -P_{cd} & +P_{ce} & -P_{de} & & \leq 0 \\
144) & -P_{ab} & & +P_{bd} & -P_{be} & & +P_{ce} & -P_{de} & & \leq 0 \\
145) & -P_{ab} & & +P_{bd} & & -P_{cd} & +P_{ce} & -P_{de} & & \leq 0 \\
146) & -P_{ab} & & +P_{bc} -P_{bd} & & & +P_{ce} & -P_{de} & & \leq 0 \\
147) & -P_{ab} & & +P_{bc} -P_{bd} & & +P_{cd} & -P_{ce} & & & \leq 0 \\
148) & -P_{ab} & & +P_{bc} -P_{bd} & & +P_{cd} & & -P_{de} & & \leq 0
\end{array}
$$

$$
\begin{aligned}
149)\ & -P_{ab} && +P_{bc}-P_{bd}+P_{be}-P_{cd} && && \le 0\\
150)\ & -P_{ab} && +P_{bc}-P_{bd}+P_{be} && -P_{ce} && \le 0\\
151)\ & -P_{ab} && +P_{bc}-P_{bd}+P_{be} && && -P_{de} \le 0\\
152)\ & -P_{ab} && +P_{bc} && -P_{be} && +P_{ce}-P_{de} \le 0\\
153)\ & -P_{ab} && +P_{bc} && && -P_{cd}+P_{ce}-P_{de} \le 0\\
154)\ & -P_{ab} && +P_{ae} && -P_{bd} && +P_{ce}-P_{de} \le 0\\
155)\ & -P_{ab} && +P_{ae} && -P_{bd} && +P_{cd}-P_{ce} && \le 0\\
156)\ & -P_{ab} && +P_{ae} && -P_{bd} && +P_{cd} && -P_{de} \le 0\\
157)\ & -P_{ab} && +P_{ae} && -P_{bd}+P_{be}-P_{cd} && && \le 0\\
158)\ & -P_{ab} && +P_{ae} && -P_{bd}+P_{be} && -P_{ce} && \le 0\\
159)\ & -P_{ab} && +P_{ae} && -P_{bd}+P_{be} && && -P_{de} \le 0\\
160)\ & -P_{ab} && +P_{ae} && && -P_{be} && +P_{ce}-P_{de} \le 0\\
161)\ & -P_{ab} && +P_{ae} && && && -P_{cd}+P_{ce}-P_{de} \le 0\\
162)\ & -P_{ab} && +P_{ad}-P_{ae} && && && +P_{ce}-P_{de} \le 0\\
163)\ & -P_{ab} && +P_{ad}-P_{ae} && && && +P_{cd}-P_{ce} && \le 0\\
164)\ & -P_{ab} && +P_{ad}-P_{ae} && && && +P_{cd} && -P_{de} \le 0\\
165)\ & -P_{ab} && +P_{ad}-P_{ae} && && +P_{be}-P_{cd} && && \le 0\\
166)\ & -P_{ab} && +P_{ad}-P_{ae} && && +P_{be} && -P_{ce} && \le 0\\
167)\ & -P_{ab} && +P_{ad}-P_{ae} && && +P_{be} && && -P_{de} \le 0\\
168)\ & -P_{ab} && +P_{ad}-P_{ae} && +P_{bd}-P_{be} && && && \le 0\\
169)\ & -P_{ab} && +P_{ad}-P_{ae} && +P_{bd} && -P_{cd} && && \le 0\\
170)\ & -P_{ab} && +P_{ad}-P_{ae} && +P_{bd} && && -P_{ce} && \le 0\\
171)\ & -P_{ab} && +P_{ad}-P_{ae} && +P_{bd} && && && -P_{de} \le 0\\
172)\ & -P_{ab} && +P_{ad} && -P_{bc} && && +P_{ce}-P_{de} \le 0\\
173)\ & -P_{ab} && +P_{ad} && -P_{bc} && && +P_{cd}-P_{ce} && \le 0\\
174)\ & -P_{ab} && +P_{ad} && -P_{bc} && && +P_{cd} && -P_{de} \le 0\\
175)\ & -P_{ab} && +P_{ad} && -P_{bc} && +P_{be}-P_{cd} && && \le 0\\
176)\ & -P_{ab} && +P_{ad} && -P_{bc} && +P_{be} && -P_{ce} && \le 0\\
177)\ & -P_{ab} && +P_{ad} && -P_{bc} && +P_{be} && && -P_{de} \le 0\\
178)\ & -P_{ab} && +P_{ad} && -P_{bc}+P_{bd}-P_{be} && && && \le 0\\
179)\ & -P_{ab} && +P_{ad} && -P_{bc}+P_{bd} && -P_{cd} && && \le 0\\
180)\ & -P_{ab} && +P_{ad} && -P_{bc}+P_{bd} && && -P_{ce} && \le 0\\
181)\ & -P_{ab} && +P_{ad} && -P_{bc}+P_{bd} && && && -P_{de} \le 0\\
182)\ & -P_{ab} && +P_{ad} && && -P_{bd} && +P_{ce}-P_{de} \le 0\\
183)\ & -P_{ab} && +P_{ad} && && -P_{bd} && +P_{cd}-P_{ce} && \le 0\\
184)\ & -P_{ab} && +P_{ad} && && -P_{bd} && +P_{cd} && -P_{de} \le 0\\
185)\ & -P_{ab} && +P_{ad} && && -P_{bd}+P_{be}-P_{cd} && && \le 0\\
186)\ & -P_{ab} && +P_{ad} && && -P_{bd}+P_{be} && -P_{ce} && \le 0\\
187)\ & -P_{ab} && +P_{ad} && && -P_{bd}+P_{be} && && -P_{de} \le 0\\
188)\ & -P_{ab} && +P_{ad} && && && -P_{be} && +P_{ce}-P_{de} \le 0\\
189)\ & -P_{ab} && +P_{ad} && && && && -P_{cd}+P_{ce}-P_{de} \le 0\\
190)\ & -P_{ab} && +P_{ad}+P_{ae}-P_{bc}-P_{bd} && && && && \le 0\\
191)\ & -P_{ab} && +P_{ad}+P_{ae}-P_{bc} && -P_{be} && && && \le 0\\
192)\ & -P_{ab} && +P_{ad}+P_{ae}-P_{bc} && && -P_{cd} && && \le 0\\
193)\ & -P_{ab} && +P_{ad}+P_{ae}-P_{bc} && && && -P_{ce} && \le 0\\
194)\ & -P_{ab} && +P_{ad}+P_{ae}-P_{bc} && && && && -P_{de} \le 0\\
195)\ & -P_{ab}+P_{ac}-P_{ad} && && && && +P_{ce}-P_{de} \le 0\\
196)\ & -P_{ab}+P_{ac}-P_{ad} && && && +P_{cd}-P_{ce} && && \le 0
\end{aligned}
$$

197) $-P_{ab}+P_{ac}-P_{ad}+P_{cd}-P_{de}\leq 0$

198) $-P_{ab}+P_{ac}-P_{ad}+P_{be}-P_{cd}\leq 0$

199) $-P_{ab}+P_{ac}-P_{ad}+P_{be}-P_{ce}\leq 0$

200) $-P_{ab}+P_{ac}-P_{ad}+P_{be}-P_{de}\leq 0$

201) $-P_{ab}+P_{ac}-P_{ad}+P_{bd}-P_{be}\leq 0$

202) $-P_{ab}+P_{ac}-P_{ad}+P_{bd}-P_{cd}\leq 0$

203) $-P_{ab}+P_{ac}-P_{ad}+P_{bd}-P_{ce}\leq 0$

204) $-P_{ab}+P_{ac}-P_{ad}+P_{bd}-P_{de}\leq 0$

205) $-P_{ab}+P_{ac}-P_{ad}+P_{ae}-P_{bd}\leq 0$

206) $-P_{ab}+P_{ac}-P_{ad}+P_{ae}-P_{be}\leq 0$

207) $-P_{ab}+P_{ac}-P_{ad}+P_{ae}-P_{cd}\leq 0$

208) $-P_{ab}+P_{ac}-P_{ad}+P_{ae}-P_{ce}\leq 0$

209) $-P_{ab}+P_{ac}-P_{ad}+P_{ae}-P_{de}\leq 0$

210) $-P_{ab}+P_{ac}-P_{ae}+P_{ce}-P_{de}\leq 0$

211) $-P_{ab}+P_{ac}-P_{ae}+P_{cd}-P_{ce}\leq 0$

212) $-P_{ab}+P_{ac}-P_{ae}+P_{cd}-P_{de}\leq 0$

213) $-P_{ab}+P_{ac}-P_{ae}+P_{be}-P_{cd}\leq 0$

214) $-P_{ab}+P_{ac}-P_{ae}+P_{be}-P_{ce}\leq 0$

215) $-P_{ab}+P_{ac}-P_{ae}+P_{be}-P_{de}\leq 0$

216) $-P_{ab}+P_{ac}-P_{ae}+P_{bd}-P_{be}\leq 0$

217) $-P_{ab}+P_{ac}-P_{ae}+P_{bd}-P_{cd}\leq 0$

218) $-P_{ab}+P_{ac}-P_{ae}+P_{bd}-P_{ce}\leq 0$

219) $-P_{ab}+P_{ac}-P_{ae}+P_{bd}-P_{de}\leq 0$

220) $-P_{ab}+P_{ac}-P_{bc}+P_{ce}-P_{de}\leq 0$

221) $-P_{ab}+P_{ac}-P_{bc}+P_{cd}-P_{ce}\leq 0$

222) $-P_{ab}+P_{ac}-P_{bc}+P_{cd}-P_{de}\leq 0$

223) $-P_{ab}+P_{ac}-P_{bc}+P_{be}-P_{cd}\leq 0$

224) $-P_{ab}+P_{ac}-P_{bc}+P_{be}-P_{ce}\leq 0$

225) $-P_{ab}+P_{ac}-P_{bc}+P_{be}-P_{de}\leq 0$

226) $-P_{ab}+P_{ac}-P_{bc}+P_{bd}-P_{be}\leq 0$

227) $-P_{ab}+P_{ac}-P_{bc}+P_{bd}-P_{cd}\leq 0$

228) $-P_{ab}+P_{ac}-P_{bc}+P_{bd}-P_{ce}\leq 0$

229) $-P_{ab}+P_{ac}-P_{bc}+P_{bd}-P_{de}\leq 0$

230) $-P_{ab}+P_{ac}-P_{bd}+P_{ce}-P_{de}\leq 0$

231) $-P_{ab}+P_{ac}-P_{bd}+P_{cd}-P_{ce}\leq 0$

232) $-P_{ab}+P_{ac}-P_{bd}+P_{cd}-P_{de}\leq 0$

233) $-P_{ab}+P_{ac}-P_{bd}+P_{be}-P_{cd}\leq 0$

234) $-P_{ab}+P_{ac}-P_{bd}+P_{be}-P_{ce}\leq 0$

235) $-P_{ab}+P_{ac}-P_{bd}+P_{be}-P_{de}\leq 0$

236) $-P_{ab}+P_{ac}-P_{be}+P_{ce}-P_{de}\leq 0$

237) $-P_{ab}+P_{ac}-P_{cd}+P_{ce}-P_{de}\leq 0$

238) $-P_{ab}+P_{ac}+P_{ae}-P_{bc}-P_{bd}\leq 0$

239) $-P_{ab}+P_{ac}+P_{ae}-P_{bc}-P_{be}\leq 0$

240) $-P_{ab}+P_{ac}+P_{ae}-P_{bc}-P_{cd}\leq 0$

241) $-P_{ab}+P_{ac}+P_{ae}-P_{bc}-P_{ce}\leq 0$

242) $-P_{ab}+P_{ac}+P_{ae}-P_{bc}-P_{de}\leq 0$

243) $-P_{ac}-P_{ae}+P_{bc}+P_{ce}-P_{de}\leq 0$

244) $-P_{ac}-P_{ae}+P_{bc}+P_{cd}-P_{ce}\leq 0$

$$
\begin{array}{lrcccccl}
245) & -P_{ac} & -P_{ae}+P_{bc} & & +P_{cd} & -P_{de} & \leq 0 \\
246) & -P_{ac} & -P_{ae}+P_{bc} & +P_{be}-P_{cd} & & & \leq 0 \\
247) & -P_{ac} & -P_{ae}+P_{bc} & +P_{be} & -P_{ce} & & \leq 0 \\
248) & -P_{ac} & -P_{ae}+P_{bc} & +P_{be} & & -P_{de} & \leq 0 \\
249) & -P_{ac} & -P_{ae}+P_{bc}+P_{bd}-P_{be} & & & & \leq 0 \\
250) & -P_{ac} & -P_{ae}+P_{bc}+P_{bd} & -P_{cd} & & & \leq 0 \\
251) & -P_{ac} & -P_{ae}+P_{bc}+P_{bd} & & -P_{ce} & & \leq 0 \\
252) & -P_{ac} & -P_{ae}+P_{bc}+P_{bd} & & & -P_{de} & \leq 0 \\
253) & -P_{ac} & & +P_{be}-P_{cd}+P_{ce} & & -P_{de} & \leq 0 \\
254) & -P_{ac} & +P_{bd}-P_{be} & & +P_{ce} & -P_{de} & \leq 0 \\
255) & -P_{ac} & +P_{bd} & -P_{cd}+P_{ce} & & -P_{de} & \leq 0 \\
256) & -P_{ac} & +P_{bc}-P_{bd} & & +P_{ce} & -P_{de} & \leq 0 \\
257) & -P_{ac} & +P_{bc}-P_{bd} & +P_{cd}-P_{ce} & & & \leq 0 \\
258) & -P_{ac} & +P_{bc}-P_{bd} & +P_{cd} & & -P_{de} & \leq 0 \\
259) & -P_{ac} & +P_{bc}-P_{bd}+P_{be}-P_{cd} & & & & \leq 0 \\
260) & -P_{ac} & +P_{bc}-P_{bd}+P_{be} & -P_{ce} & & & \leq 0 \\
261) & -P_{ac} & +P_{bc}-P_{bd}+P_{be} & & & -P_{de} & \leq 0 \\
262) & -P_{ac} & +P_{bc} & -P_{be} & +P_{ce} & -P_{de} & \leq 0 \\
263) & -P_{ac} & +P_{bc} & & -P_{cd}+P_{ce} & -P_{de} & \leq 0 \\
264) & -P_{ac} & +P_{ae} & -P_{bd} & & +P_{ce}-P_{de} & \leq 0 \\
265) & -P_{ac} & +P_{ae} & -P_{bd} & +P_{cd}-P_{ce} & & \leq 0 \\
266) & -P_{ac} & +P_{ae} & -P_{bd} & +P_{cd} & -P_{de} & \leq 0 \\
267) & -P_{ac} & +P_{ae} & -P_{bd}+P_{be}-P_{cd} & & & \leq 0 \\
268) & -P_{ac} & +P_{ae} & -P_{bd}+P_{be} & -P_{ce} & & \leq 0 \\
269) & -P_{ac} & +P_{ae} & -P_{bd}+P_{be} & & -P_{de} & \leq 0 \\
270) & -P_{ac} & +P_{ae} & & -P_{be}+P_{ce} & -P_{de} & \leq 0 \\
271) & -P_{ac} & +P_{ae} & & -P_{cd}+P_{ce} & -P_{de} & \leq 0 \\
272) & -P_{ac}+P_{ad}-P_{ae} & & & & +P_{ce}-P_{de} & \leq 0 \\
273) & -P_{ac}+P_{ad}-P_{ae} & & & +P_{cd}-P_{ce} & & \leq 0 \\
274) & -P_{ac}+P_{ad}-P_{ae} & & & +P_{cd} & -P_{de} & \leq 0 \\
275) & -P_{ac}+P_{ad}-P_{ae} & & +P_{be}-P_{cd} & & & \leq 0 \\
276) & -P_{ac}+P_{ad}-P_{ae} & & +P_{be} & -P_{ce} & & \leq 0 \\
277) & -P_{ac}+P_{ad}-P_{ae} & & +P_{be} & & -P_{de} & \leq 0 \\
278) & -P_{ac}+P_{ad}-P_{ae} & +P_{bd}-P_{be} & & & & \leq 0 \\
279) & -P_{ac}+P_{ad}-P_{ae} & +P_{bd} & -P_{cd} & & & \leq 0 \\
280) & -P_{ac}+P_{ad}-P_{ae} & +P_{bd} & & -P_{ce} & & \leq 0 \\
281) & -P_{ac}+P_{ad}-P_{ae} & +P_{bd} & & & -P_{de} & \leq 0 \\
282) & -P_{ac}+P_{ad} & -P_{bc} & & +P_{ce} & -P_{de} & \leq 0 \\
283) & -P_{ac}+P_{ad} & -P_{bc} & +P_{cd}-P_{ce} & & & \leq 0 \\
284) & -P_{ac}+P_{ad} & -P_{bc} & +P_{cd} & & -P_{de} & \leq 0 \\
285) & -P_{ac}+P_{ad} & -P_{bc} & +P_{be}-P_{cd} & & & \leq 0 \\
286) & -P_{ac}+P_{ad} & -P_{bc} & +P_{be} & -P_{ce} & & \leq 0 \\
287) & -P_{ac}+P_{ad} & -P_{bc} & +P_{be} & & -P_{de} & \leq 0 \\
288) & -P_{ac}+P_{ad} & -P_{bc}+P_{bd}-P_{be} & & & & \leq 0 \\
289) & -P_{ac}+P_{ad} & -P_{bc}+P_{bd} & -P_{cd} & & & \leq 0 \\
290) & -P_{ac}+P_{ad} & -P_{bc}+P_{bd} & & -P_{ce} & & \leq 0 \\
291) & -P_{ac}+P_{ad} & -P_{bc}+P_{bd} & & & -P_{de} & \leq 0 \\
292) & -P_{ac}+P_{ad} & & -P_{bd} & & +P_{ce}-P_{de} & \leq 0
\end{array}
$$

293) $-P_{ac}+P_{ad}-P_{bd}+P_{cd}-P_{ce}\leq 0$
294) $-P_{ac}+P_{ad}-P_{bd}+P_{cd}-P_{de}\leq 0$
295) $-P_{ac}+P_{ad}-P_{bd}+P_{be}-P_{cd}\leq 0$
296) $-P_{ac}+P_{ad}-P_{bd}+P_{be}-P_{ce}\leq 0$
297) $-P_{ac}+P_{ad}-P_{bd}+P_{be}-P_{de}\leq 0$
298) $-P_{ac}+P_{ad}-P_{be}+P_{ce}-P_{de}\leq 0$
299) $-P_{ac}+P_{ad}-P_{cd}+P_{ce}-P_{de}\leq 0$
300) $-P_{ac}+P_{ad}+P_{ae}-P_{bc}-P_{bd}\leq 0$
301) $-P_{ac}+P_{ad}+P_{ae}-P_{bc}-P_{be}\leq 0$
302) $-P_{ac}+P_{ad}+P_{ae}-P_{bc}-P_{cd}\leq 0$
303) $-P_{ac}+P_{ad}+P_{ae}-P_{bc}-P_{ce}\leq 0$
304) $-P_{ac}+P_{ad}+P_{ae}-P_{bc}-P_{de}\leq 0$
305) $-P_{ad}+P_{be}-P_{cd}+P_{ce}-P_{de}\leq 0$
306) $-P_{ad}+P_{bd}-P_{be}+P_{ce}-P_{de}\leq 0$
307) $-P_{ad}+P_{bd}-P_{cd}+P_{ce}-P_{de}\leq 0$
308) $-P_{ad}+P_{ae}-P_{bd}+P_{ce}-P_{de}\leq 0$
309) $-P_{ad}+P_{ae}-P_{bd}+P_{cd}-P_{ce}\leq 0$
310) $-P_{ad}+P_{ae}-P_{bd}+P_{cd}-P_{de}\leq 0$
311) $-P_{ad}+P_{ae}-P_{bd}+P_{be}-P_{cd}\leq 0$
312) $-P_{ad}+P_{ae}-P_{bd}+P_{be}-P_{ce}\leq 0$
313) $-P_{ad}+P_{ae}-P_{bd}+P_{be}-P_{de}\leq 0$
314) $-P_{ad}+P_{ae}-P_{be}+P_{ce}-P_{de}\leq 0$
315) $-P_{ad}+P_{ae}-P_{cd}+P_{ce}-P_{de}\leq 0$
316) $-P_{ae}+P_{be}-P_{cd}+P_{ce}-P_{de}\leq 0$
317) $-P_{ae}+P_{bd}-P_{be}+P_{ce}-P_{de}\leq 0$
318) $-P_{ae}+P_{bd}-P_{cd}+P_{ce}-P_{de}\leq 0$
319) $-P_{bc}+P_{be}-P_{cd}+P_{ce}-P_{de}\leq 0$
320) $-P_{bc}+P_{bd}-P_{be}+P_{ce}-P_{de}\leq 0$
321) $-P_{bc}+P_{bd}-P_{cd}+P_{ce}-P_{de}\leq 0$
322) $-P_{bd}+P_{be}-P_{cd}+P_{ce}-P_{de}\leq 0$
323) $P_{ae}-P_{bc}-P_{bd}+P_{ce}-P_{de}\leq 0$
324) $P_{ae}-P_{bc}-P_{bd}+P_{cd}-P_{ce}\leq 0$
325) $P_{ae}-P_{bc}-P_{bd}+P_{cd}-P_{de}\leq 0$
326) $P_{ae}-P_{bc}-P_{bd}+P_{be}-P_{cd}\leq 0$
327) $P_{ae}-P_{bc}-P_{bd}+P_{be}-P_{ce}\leq 0$
328) $P_{ae}-P_{bc}-P_{bd}+P_{be}-P_{de}\leq 0$
329) $P_{ae}-P_{bc}-P_{be}+P_{ce}-P_{de}\leq 0$
330) $P_{ae}-P_{bc}-P_{cd}+P_{ce}-P_{de}\leq 0$
331) $-P_{ab}-P_{ae}+P_{bc}+P_{be}-P_{cd}+P_{ce}-P_{de}\leq 0$
332) $-P_{ab}-P_{ae}+P_{bc}+P_{bd}-P_{be}+P_{ce}-P_{de}\leq 0$
333) $-P_{ab}-P_{ae}+P_{bc}+P_{bd}-P_{cd}+P_{ce}-P_{de}\leq 0$
334) $-P_{ab}+P_{bc}-P_{bd}+P_{be}-P_{cd}+P_{ce}-P_{de}\leq 0$
335) $-P_{ab}+P_{ae}-P_{bd}+P_{be}-P_{cd}+P_{ce}-P_{de}\leq 0$
336) $-P_{ab}+P_{ad}-P_{ae}+P_{be}-P_{cd}+P_{ce}-P_{de}\leq 0$
337) $-P_{ab}+P_{ad}-P_{ae}+P_{bd}-P_{be}+P_{ce}-P_{de}\leq 0$
338) $-P_{ab}+P_{ad}-P_{ae}+P_{bd}-P_{cd}+P_{ce}-P_{de}\leq 0$
339) $-P_{ab}+P_{ad}-P_{bc}+P_{be}-P_{cd}+P_{ce}-P_{de}\leq 0$
340) $-P_{ab}+P_{ad}-P_{bc}+P_{bd}-P_{be}+P_{ce}-P_{de}\leq 0$

$$
\begin{aligned}
341)\ & -P_{ab} + P_{ad} - P_{bc} + P_{bd} - P_{cd} + P_{ce} - P_{de} \le 0\\
342)\ & -P_{ab} + P_{ad} - P_{bd} + P_{be} - P_{cd} + P_{ce} - P_{de} \le 0\\
343)\ & -P_{ab} + P_{ad} + P_{ae} - P_{bc} - P_{bd} + P_{ce} - P_{de} \le 0\\
344)\ & -P_{ab} + P_{ad} + P_{ae} - P_{bc} - P_{bd} + P_{cd} - P_{ce} \le 0\\
345)\ & -P_{ab} + P_{ad} + P_{ae} - P_{bc} - P_{bd} + P_{cd} - P_{de} \le 0\\
346)\ & -P_{ab} + P_{ad} + P_{ae} - P_{bc} - P_{bd} + P_{be} - P_{cd} \le 0\\
347)\ & -P_{ab} + P_{ad} + P_{ae} - P_{bc} - P_{bd} + P_{be} - P_{ce} \le 0\\
348)\ & -P_{ab} + P_{ad} + P_{ae} - P_{bc} - P_{bd} + P_{be} - P_{de} \le 0\\
349)\ & -P_{ab} + P_{ad} + P_{ae} - P_{bc} - P_{be} + P_{ce} - P_{de} \le 0\\
350)\ & -P_{ab} + P_{ad} + P_{ae} - P_{bc} - P_{cd} + P_{ce} - P_{de} \le 0\\
351)\ & -P_{ab} + P_{ac} - P_{ad} + P_{be} - P_{cd} + P_{ce} - P_{de} \le 0\\
352)\ & -P_{ab} + P_{ac} - P_{ad} + P_{bd} - P_{be} + P_{ce} - P_{de} \le 0\\
353)\ & -P_{ab} + P_{ac} - P_{ad} + P_{bd} - P_{cd} + P_{ce} - P_{de} \le 0\\
354)\ & -P_{ab} + P_{ac} - P_{ad} + P_{ae} - P_{bd} + P_{ce} - P_{de} \le 0\\
355)\ & -P_{ab} + P_{ac} - P_{ad} + P_{ae} - P_{bd} + P_{cd} - P_{ce} \le 0\\
356)\ & -P_{ab} + P_{ac} - P_{ad} + P_{ae} - P_{bd} + P_{cd} - P_{de} \le 0\\
357)\ & -P_{ab} + P_{ac} - P_{ad} + P_{ae} - P_{bd} + P_{be} - P_{cd} \le 0\\
358)\ & -P_{ab} + P_{ac} - P_{ad} + P_{ae} - P_{bd} + P_{be} - P_{ce} \le 0\\
359)\ & -P_{ab} + P_{ac} - P_{ad} + P_{ae} - P_{bd} + P_{be} - P_{de} \le 0\\
360)\ & -P_{ab} + P_{ac} - P_{ad} + P_{ae} - P_{be} + P_{ce} - P_{de} \le 0\\
361)\ & -P_{ab} + P_{ac} - P_{ad} + P_{ae} - P_{cd} + P_{ce} - P_{de} \le 0\\
362)\ & -P_{ab} + P_{ac} - P_{ae} + P_{be} - P_{cd} + P_{ce} - P_{de} \le 0\\
363)\ & -P_{ab} + P_{ac} - P_{ae} + P_{bd} - P_{be} + P_{ce} - P_{de} \le 0\\
364)\ & -P_{ab} + P_{ac} - P_{ae} + P_{bd} - P_{cd} + P_{ce} - P_{de} \le 0\\
365)\ & -P_{ab} + P_{ac} - P_{bc} + P_{be} - P_{cd} + P_{ce} - P_{de} \le 0\\
366)\ & -P_{ab} + P_{ac} - P_{bc} + P_{bd} - P_{be} + P_{ce} - P_{de} \le 0\\
367)\ & -P_{ab} + P_{ac} - P_{bc} + P_{bd} - P_{cd} + P_{ce} - P_{de} \le 0\\
368)\ & -P_{ab} + P_{ac} - P_{bd} + P_{be} - P_{cd} + P_{ce} - P_{de} \le 0\\
369)\ & -P_{ab} + P_{ac} + P_{ae} - P_{bc} - P_{bd} + P_{ce} - P_{de} \le 0\\
370)\ & -P_{ab} + P_{ac} + P_{ae} - P_{bc} - P_{bd} + P_{cd} - P_{ce} \le 0\\
371)\ & -P_{ab} + P_{ac} + P_{ae} - P_{bc} - P_{bd} + P_{cd} - P_{de} \le 0\\
372)\ & -P_{ab} + P_{ac} + P_{ae} - P_{bc} - P_{bd} + P_{be} - P_{cd} \le 0\\
373)\ & -P_{ab} + P_{ac} + P_{ae} - P_{bc} - P_{bd} + P_{be} - P_{ce} \le 0\\
374)\ & -P_{ab} + P_{ac} + P_{ae} - P_{bc} - P_{bd} + P_{be} - P_{de} \le 0\\
375)\ & -P_{ab} + P_{ac} + P_{ae} - P_{bc} - P_{be} + P_{ce} - P_{de} \le 0\\
376)\ & -P_{ab} + P_{ac} + P_{ae} - P_{bc} - P_{cd} + P_{ce} - P_{de} \le 0\\
377)\ & -P_{ac} - P_{ae} + P_{bc} + P_{be} - P_{cd} + P_{ce} - P_{de} \le 0\\
378)\ & -P_{ac} - P_{ae} + P_{bc} + P_{bd} - P_{be} + P_{ce} - P_{de} \le 0\\
379)\ & -P_{ac} - P_{ae} + P_{bc} + P_{bd} - P_{cd} + P_{ce} - P_{de} \le 0\\
380)\ & -P_{ac} + P_{bc} - P_{bd} + P_{be} - P_{cd} + P_{ce} - P_{de} \le 0\\
381)\ & -P_{ac} + P_{ae} - P_{bd} + P_{be} - P_{cd} + P_{ce} - P_{de} \le 0\\
382)\ & -P_{ac} + P_{ad} - P_{ae} + P_{be} - P_{cd} + P_{ce} - P_{de} \le 0\\
383)\ & -P_{ac} + P_{ad} - P_{ae} + P_{bd} - P_{be} + P_{ce} - P_{de} \le 0\\
384)\ & -P_{ac} + P_{ad} - P_{ae} + P_{bd} - P_{cd} + P_{ce} - P_{de} \le 0\\
385)\ & -P_{ac} + P_{ad} - P_{bc} + P_{be} - P_{cd} + P_{ce} - P_{de} \le 0\\
386)\ & -P_{ac} + P_{ad} - P_{bc} + P_{bd} - P_{be} + P_{ce} - P_{de} \le 0\\
387)\ & -P_{ac} + P_{ad} - P_{bc} + P_{bd} - P_{cd} + P_{ce} - P_{de} \le 0\\
388)\ & -P_{ac} + P_{ad} - P_{bd} + P_{be} - P_{cd} + P_{ce} - P_{de} \le 0
\end{aligned}
$$

$$
\begin{aligned}
389)\quad & -P_{ac}+P_{ad}+P_{ae}-P_{bc}-P_{bd}+P_{ce}-P_{de}\le 0\\
390)\quad & -P_{ac}+P_{ad}+P_{ae}-P_{bc}-P_{bd}+P_{cd}-P_{ce}\le 0\\
391)\quad & -P_{ac}+P_{ad}+P_{ae}-P_{bc}-P_{bd}+P_{cd}-P_{de}\le 0\\
392)\quad & -P_{ac}+P_{ad}+P_{ae}-P_{bc}-P_{bd}+P_{be}-P_{cd}\le 0\\
393)\quad & -P_{ac}+P_{ad}+P_{ae}-P_{bc}-P_{bd}+P_{be}-P_{ce}\le 0\\
394)\quad & -P_{ac}+P_{ad}+P_{ae}-P_{bc}-P_{bd}+P_{be}-P_{de}\le 0\\
395)\quad & -P_{ac}+P_{ad}+P_{ae}-P_{bc}-P_{be}+P_{ce}-P_{de}\le 0\\
396)\quad & -P_{ac}+P_{ad}+P_{ae}-P_{bc}-P_{cd}+P_{ce}-P_{de}\le 0\\
397)\quad & -P_{ad}+P_{ae}-P_{bd}+P_{be}-P_{cd}+P_{ce}-P_{de}\le 0\\
398)\quad & P_{ae}-P_{bc}-P_{bd}+P_{be}-P_{cd}+P_{ce}-P_{de}\le 0\\
399)\quad & -P_{ab}+P_{ad}+P_{ae}-P_{bc}-P_{bd}+P_{be}-P_{cd}+P_{ce}-P_{de}\le 0\\
400)\quad & -P_{ab}+P_{ac}-P_{ad}+P_{ae}-P_{bd}+P_{be}-P_{cd}+P_{ce}-P_{de}\le 0\\
401)\quad & -P_{ab}+P_{ac}+P_{ae}-P_{bc}-P_{bd}+P_{be}-P_{cd}+P_{ce}-P_{de}\le 0\\
402)\quad & -P_{ac}+P_{ad}+P_{ae}-P_{bc}-P_{bd}+P_{be}-P_{cd}+P_{ce}-P_{de}\le 0\\
403)\quad & -P_{ae}+P_{bc}+P_{de}\le 1\\
404)\quad & -P_{ae}+P_{bc}+P_{ce}\le 1\\
405)\quad & -P_{ae}+P_{bc}+P_{cd}\le 1\\
406)\quad & -P_{ae}+P_{bc}+P_{be}\le 1\\
407)\quad & -P_{ae}+P_{bc}+P_{bd}\le 1\\
408)\quad & P_{cd}-P_{ce}+P_{de}\le 1\\
409)\quad & P_{be}-P_{cd}+P_{de}\le 1\\
410)\quad & P_{be}-P_{cd}+P_{ce}\le 1\\
411)\quad & P_{be}-P_{ce}+P_{de}\le 1\\
412)\quad & P_{bd}-P_{be}+P_{de}\le 1\\
413)\quad & P_{bd}-P_{be}+P_{ce}\le 1\\
414)\quad & P_{bd}-P_{cd}+P_{de}\le 1\\
415)\quad & P_{bd}-P_{cd}+P_{ce}\le 1\\
416)\quad & P_{bd}-P_{ce}+P_{de}\le 1\\
417)\quad & P_{bc}-P_{bd}+P_{de}\le 1\\
418)\quad & P_{bc}-P_{bd}+P_{ce}\le 1\\
419)\quad & P_{bc}-P_{bd}+P_{cd}\le 1\\
420)\quad & P_{bc}-P_{bd}+P_{be}\le 1\\
421)\quad & P_{bc}-P_{be}+P_{de}\le 1\\
422)\quad & P_{bc}-P_{be}+P_{ce}\le 1\\
423)\quad & P_{bc}-P_{cd}+P_{de}\le 1\\
424)\quad & P_{bc}-P_{cd}+P_{ce}\le 1\\
425)\quad & P_{bc}-P_{ce}+P_{de}\le 1\\
426)\quad & P_{ae}-P_{bd}+P_{de}\le 1\\
427)\quad & P_{ae}-P_{bd}+P_{ce}\le 1\\
428)\quad & P_{ae}-P_{bd}+P_{cd}\le 1\\
429)\quad & P_{ae}-P_{bd}+P_{be}\le 1\\
430)\quad & P_{ae}-P_{be}+P_{de}\le 1\\
431)\quad & P_{ae}-P_{be}+P_{ce}\le 1\\
432)\quad & P_{ae}-P_{cd}+P_{de}\le 1\\
433)\quad & P_{ae}-P_{cd}+P_{ce}\le 1\\
434)\quad & P_{ae}-P_{ce}+P_{de}\le 1\\
435)\quad & P_{ad}-P_{ae}+P_{de}\le 1\\
436)\quad & P_{ad}-P_{ae}+P_{ce}\le 1
\end{aligned}
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437) $P_{ad} - P_{ae} + P_{cd} \leq 1$
438) $P_{ad} - P_{ae} + P_{be} \leq 1$
439) $P_{ad} - P_{ae} + P_{bd} \leq 1$
440) $P_{ad} - P_{bc} + P_{de} \leq 1$
441) $P_{ad} - P_{bc} + P_{ce} \leq 1$
442) $P_{ad} - P_{bc} + P_{cd} \leq 1$
443) $P_{ad} - P_{bc} + P_{be} \leq 1$
444) $P_{ad} - P_{bc} + P_{bd} \leq 1$
445) $P_{ad} - P_{bd} + P_{de} \leq 1$
446) $P_{ad} - P_{bd} + P_{ce} \leq 1$
447) $P_{ad} - P_{bd} + P_{cd} \leq 1$
448) $P_{ad} - P_{bd} + P_{be} \leq 1$
449) $P_{ad} - P_{be} + P_{de} \leq 1$
450) $P_{ad} - P_{be} + P_{ce} \leq 1$
451) $P_{ad} - P_{cd} + P_{de} \leq 1$
452) $P_{ad} - P_{cd} + P_{ce} \leq 1$
453) $P_{ad} - P_{ce} + P_{de} \leq 1$
454) $P_{ad} + P_{ae} - P_{bc} \leq 1$
455) $P_{ac} - P_{ad} + P_{de} \leq 1$
456) $P_{ac} - P_{ad} + P_{ce} \leq 1$
457) $P_{ac} - P_{ad} + P_{cd} \leq 1$
458) $P_{ac} - P_{ad} + P_{be} \leq 1$
459) $P_{ac} - P_{ad} + P_{bd} \leq 1$
460) $P_{ac} - P_{ad} + P_{ae} \leq 1$
461) $P_{ac} - P_{ae} + P_{de} \leq 1$
462) $P_{ac} - P_{ae} + P_{ce} \leq 1$
463) $P_{ac} - P_{ae} + P_{cd} \leq 1$
464) $P_{ac} - P_{ae} + P_{be} \leq 1$
465) $P_{ac} - P_{ae} + P_{bd} \leq 1$
466) $P_{ac} - P_{bc} + P_{de} \leq 1$
467) $P_{ac} - P_{bc} + P_{ce} \leq 1$
468) $P_{ac} - P_{bc} + P_{cd} \leq 1$
469) $P_{ac} - P_{bc} + P_{be} \leq 1$
470) $P_{ac} - P_{bc} + P_{bd} \leq 1$
471) $P_{ac} - P_{bd} + P_{de} \leq 1$
472) $P_{ac} - P_{bd} + P_{ce} \leq 1$
473) $P_{ac} - P_{bd} + P_{cd} \leq 1$
474) $P_{ac} - P_{bd} + P_{be} \leq 1$
475) $P_{ac} - P_{be} + P_{de} \leq 1$
476) $P_{ac} - P_{be} + P_{ce} \leq 1$
477) $P_{ac} - P_{cd} + P_{de} \leq 1$
478) $P_{ac} - P_{cd} + P_{ce} \leq 1$
479) $P_{ac} - P_{ce} + P_{de} \leq 1$
480) $P_{ac} + P_{ae} - P_{bc} \leq 1$
481) $P_{ab} - P_{ac} + P_{de} \leq 1$
482) $P_{ab} - P_{ac} + P_{ce} \leq 1$
483) $P_{ab} - P_{ac} + P_{cd} \leq 1$
484) $P_{ab} - P_{ac} + P_{be} \leq 1$

$$
\begin{array}{lrcl}
485) & P_{ab} - P_{ac} + P_{bd} & \leq & 1 \\
486) & P_{ab} - P_{ac} + P_{bc} & \leq & 1 \\
487) & P_{ab} - P_{ac} + P_{ae} & \leq & 1 \\
488) & P_{ab} - P_{ac} + P_{ad} & \leq & 1 \\
489) & P_{ab} - P_{ad} + P_{de} & \leq & 1 \\
490) & P_{ab} - P_{ad} + P_{ce} & \leq & 1 \\
491) & P_{ab} - P_{ad} + P_{cd} & \leq & 1 \\
492) & P_{ab} - P_{ad} + P_{be} & \leq & 1 \\
493) & P_{ab} - P_{ad} + P_{bd} & \leq & 1 \\
494) & P_{ab} - P_{ad} + P_{ae} & \leq & 1 \\
495) & P_{ab} - P_{ae} + P_{de} & \leq & 1 \\
496) & P_{ab} - P_{ae} + P_{ce} & \leq & 1 \\
497) & P_{ab} - P_{ae} + P_{cd} & \leq & 1 \\
498) & P_{ab} - P_{ae} + P_{be} & \leq & 1 \\
499) & P_{ab} - P_{ae} + P_{bd} & \leq & 1 \\
500) & P_{ab} - P_{bc} + P_{de} & \leq & 1 \\
501) & P_{ab} - P_{bc} + P_{ce} & \leq & 1 \\
502) & P_{ab} - P_{bc} + P_{cd} & \leq & 1 \\
503) & P_{ab} - P_{bc} + P_{be} & \leq & 1 \\
504) & P_{ab} - P_{bc} + P_{bd} & \leq & 1 \\
505) & P_{ab} - P_{bd} + P_{de} & \leq & 1 \\
506) & P_{ab} - P_{bd} + P_{ce} & \leq & 1 \\
507) & P_{ab} - P_{bd} + P_{cd} & \leq & 1 \\
508) & P_{ab} - P_{bd} + P_{be} & \leq & 1 \\
509) & P_{ab} - P_{be} + P_{de} & \leq & 1 \\
510) & P_{ab} - P_{be} + P_{ce} & \leq & 1 \\
511) & P_{ab} - P_{cd} + P_{de} & \leq & 1 \\
512) & P_{ab} - P_{cd} + P_{ce} & \leq & 1 \\
513) & P_{ab} - P_{ce} + P_{de} & \leq & 1 \\
514) & P_{ab} + P_{ae} - P_{bc} & \leq & 1 \\
515) & - P_{ae} + P_{bc} + P_{cd} - P_{ce} + P_{de} & \leq & 1 \\
516) & - P_{ae} + P_{bc} + P_{be} - P_{cd} + P_{de} & \leq & 1 \\
517) & - P_{ae} + P_{bc} + P_{be} - P_{cd} + P_{ce} & \leq & 1 \\
518) & - P_{ae} + P_{bc} + P_{be} - P_{ce} + P_{de} & \leq & 1 \\
519) & - P_{ae} + P_{bc} + P_{bd} - P_{be} + P_{de} & \leq & 1 \\
520) & - P_{ae} + P_{bc} + P_{bd} - P_{be} + P_{ce} & \leq & 1 \\
521) & - P_{ae} + P_{bc} + P_{bd} - P_{cd} + P_{de} & \leq & 1 \\
522) & - P_{ae} + P_{bc} + P_{bd} - P_{cd} + P_{ce} & \leq & 1 \\
523) & - P_{ae} + P_{bc} + P_{bd} - P_{ce} + P_{de} & \leq & 1 \\
524) & P_{bc} - P_{bd} + P_{cd} - P_{ce} + P_{de} & \leq & 1 \\
525) & P_{bc} - P_{bd} + P_{be} - P_{cd} + P_{de} & \leq & 1 \\
526) & P_{bc} - P_{bd} + P_{be} - P_{cd} + P_{ce} & \leq & 1 \\
527) & P_{bc} - P_{bd} + P_{be} - P_{ce} + P_{de} & \leq & 1 \\
528) & P_{ae} - P_{bd} + P_{cd} - P_{ce} + P_{de} & \leq & 1 \\
529) & P_{ae} - P_{bd} + P_{be} - P_{cd} + P_{de} & \leq & 1 \\
530) & P_{ae} - P_{bd} + P_{be} - P_{cd} + P_{ce} & \leq & 1 \\
531) & P_{ae} - P_{bd} + P_{be} - P_{ce} + P_{de} & \leq & 1 \\
532) & P_{ad} - P_{ae} + P_{cd} - P_{ce} + P_{de} & \leq & 1
\end{array}
$$

533) $P_{ad} - P_{ae} + P_{be} - P_{cd} + P_{de} \leq 1$
534) $P_{ad} - P_{ae} + P_{be} - P_{cd} + P_{ce} \leq 1$
535) $P_{ad} - P_{ae} + P_{be} - P_{ce} + P_{de} \leq 1$
536) $P_{ad} - P_{ae} + P_{bd} - P_{be} + P_{de} \leq 1$
537) $P_{ad} - P_{ae} + P_{bd} - P_{be} + P_{ce} \leq 1$
538) $P_{ad} - P_{ae} + P_{bd} - P_{cd} + P_{de} \leq 1$
539) $P_{ad} - P_{ae} + P_{bd} - P_{cd} + P_{ce} \leq 1$
540) $P_{ad} - P_{ae} + P_{bd} - P_{ce} + P_{de} \leq 1$
541) $P_{ad} - P_{bc} + P_{cd} - P_{ce} + P_{de} \leq 1$
542) $P_{ad} - P_{bc} + P_{be} - P_{cd} + P_{de} \leq 1$
543) $P_{ad} - P_{bc} + P_{be} - P_{cd} + P_{ce} \leq 1$
544) $P_{ad} - P_{bc} + P_{be} - P_{ce} + P_{de} \leq 1$
545) $P_{ad} - P_{bc} + P_{bd} - P_{be} + P_{de} \leq 1$
546) $P_{ad} - P_{bc} + P_{bd} - P_{be} + P_{ce} \leq 1$
547) $P_{ad} - P_{bc} + P_{bd} - P_{cd} + P_{de} \leq 1$
548) $P_{ad} - P_{bc} + P_{bd} - P_{cd} + P_{ce} \leq 1$
549) $P_{ad} - P_{bc} + P_{bd} - P_{ce} + P_{de} \leq 1$
550) $P_{ad} - P_{bd} + P_{cd} - P_{ce} + P_{de} \leq 1$
551) $P_{ad} - P_{bd} + P_{be} - P_{cd} + P_{de} \leq 1$
552) $P_{ad} - P_{bd} + P_{be} - P_{cd} + P_{ce} \leq 1$
553) $P_{ad} - P_{bd} + P_{be} - P_{ce} + P_{de} \leq 1$
554) $P_{ad} + P_{ae} - P_{bc} - P_{bd} + P_{de} \leq 1$
555) $P_{ad} + P_{ae} - P_{bc} - P_{bd} + P_{ce} \leq 1$
556) $P_{ad} + P_{ae} - P_{bc} - P_{bd} + P_{cd} \leq 1$
557) $P_{ad} + P_{ae} - P_{bc} - P_{bd} + P_{be} \leq 1$
558) $P_{ad} + P_{ae} - P_{bc} - P_{be} + P_{de} \leq 1$
559) $P_{ad} + P_{ae} - P_{bc} - P_{be} + P_{ce} \leq 1$
560) $P_{ad} + P_{ae} - P_{bc} - P_{cd} + P_{de} \leq 1$
561) $P_{ad} + P_{ae} - P_{bc} - P_{cd} + P_{ce} \leq 1$
562) $P_{ad} + P_{ae} - P_{bc} - P_{ce} + P_{de} \leq 1$
563) $P_{ac} - P_{ad} + P_{cd} - P_{ce} + P_{de} \leq 1$
564) $P_{ac} - P_{ad} + P_{be} - P_{cd} + P_{de} \leq 1$
565) $P_{ac} - P_{ad} + P_{be} - P_{cd} + P_{ce} \leq 1$
566) $P_{ac} - P_{ad} + P_{be} - P_{ce} + P_{de} \leq 1$
567) $P_{ac} - P_{ad} + P_{bd} - P_{be} + P_{de} \leq 1$
568) $P_{ac} - P_{ad} + P_{bd} - P_{be} + P_{ce} \leq 1$
569) $P_{ac} - P_{ad} + P_{bd} - P_{cd} + P_{de} \leq 1$
570) $P_{ac} - P_{ad} + P_{bd} - P_{cd} + P_{ce} \leq 1$
571) $P_{ac} - P_{ad} + P_{bd} - P_{ce} + P_{de} \leq 1$
572) $P_{ac} - P_{ad} + P_{ae} - P_{bd} + P_{de} \leq 1$
573) $P_{ac} - P_{ad} + P_{ae} - P_{bd} + P_{ce} \leq 1$
574) $P_{ac} - P_{ad} + P_{ae} - P_{bd} + P_{cd} \leq 1$
575) $P_{ac} - P_{ad} + P_{ae} - P_{bd} + P_{be} \leq 1$
576) $P_{ac} - P_{ad} + P_{ae} - P_{be} + P_{de} \leq 1$
577) $P_{ac} - P_{ad} + P_{ae} - P_{be} + P_{ce} \leq 1$
578) $P_{ac} - P_{ad} + P_{ae} - P_{cd} + P_{de} \leq 1$
579) $P_{ac} - P_{ad} + P_{ae} - P_{cd} + P_{ce} \leq 1$
580) $P_{ac} - P_{ad} + P_{ae} - P_{ce} + P_{de} \leq 1$

581) $P_{ac} - P_{ae} + P_{cd} - P_{ce} + P_{de} \le 1$

582) $P_{ac} - P_{ae} + P_{be} - P_{cd} + P_{de} \le 1$

583) $P_{ac} - P_{ae} + P_{be} - P_{cd} + P_{ce} \le 1$

584) $P_{ac} - P_{ae} + P_{be} - P_{ce} + P_{de} \le 1$

585) $P_{ac} - P_{ae} + P_{bd} - P_{be} + P_{de} \le 1$

586) $P_{ac} - P_{ae} + P_{bd} - P_{be} + P_{ce} \le 1$

587) $P_{ac} - P_{ae} + P_{bd} - P_{cd} + P_{de} \le 1$

588) $P_{ac} - P_{ae} + P_{bd} - P_{cd} + P_{ce} \le 1$

589) $P_{ac} - P_{ae} + P_{bd} - P_{ce} + P_{de} \le 1$

590) $P_{ac} - P_{bc} + P_{cd} - P_{ce} + P_{de} \le 1$

591) $P_{ac} - P_{bc} + P_{be} - P_{cd} + P_{de} \le 1$

592) $P_{ac} - P_{bc} + P_{be} - P_{cd} + P_{ce} \le 1$

593) $P_{ac} - P_{bc} + P_{be} - P_{ce} + P_{de} \le 1$

594) $P_{ac} - P_{bc} + P_{bd} - P_{be} + P_{de} \le 1$

595) $P_{ac} - P_{bc} + P_{bd} - P_{be} + P_{ce} \le 1$

596) $P_{ac} - P_{bc} + P_{bd} - P_{cd} + P_{de} \le 1$

597) $P_{ac} - P_{bc} + P_{bd} - P_{cd} + P_{ce} \le 1$

598) $P_{ac} - P_{bc} + P_{bd} - P_{ce} + P_{de} \le 1$

599) $P_{ac} - P_{bd} + P_{cd} - P_{ce} + P_{de} \le 1$

600) $P_{ac} - P_{bd} + P_{be} - P_{cd} + P_{de} \le 1$

601) $P_{ac} - P_{bd} + P_{be} - P_{cd} + P_{ce} \le 1$

602) $P_{ac} - P_{bd} + P_{be} - P_{ce} + P_{de} \le 1$

603) $P_{ac} + P_{ae} - P_{bc} - P_{bd} + P_{de} \le 1$

604) $P_{ac} + P_{ae} - P_{bc} - P_{bd} + P_{ce} \le 1$

605) $P_{ac} + P_{ae} - P_{bc} - P_{bd} + P_{cd} \le 1$

606) $P_{ac} + P_{ae} - P_{bc} - P_{bd} + P_{be} \le 1$

607) $P_{ac} + P_{ae} - P_{bc} - P_{be} + P_{de} \le 1$

608) $P_{ac} + P_{ae} - P_{bc} - P_{be} + P_{ce} \le 1$

609) $P_{ac} + P_{ae} - P_{bc} - P_{cd} + P_{de} \le 1$

610) $P_{ac} + P_{ae} - P_{bc} - P_{cd} + P_{ce} \le 1$

611) $P_{ac} + P_{ae} - P_{bc} - P_{ce} + P_{de} \le 1$

612) $P_{ab} - P_{ac} - P_{ae} + P_{bc} + P_{de} \le 1$

613) $P_{ab} - P_{ac} - P_{ae} + P_{bc} + P_{ce} \le 1$

614) $P_{ab} - P_{ac} - P_{ae} + P_{bc} + P_{cd} \le 1$

615) $P_{ab} - P_{ac} - P_{ae} + P_{bc} + P_{be} \le 1$

616) $P_{ab} - P_{ac} - P_{ae} + P_{bc} + P_{bd} \le 1$

617) $P_{ab} - P_{ac} + P_{cd} - P_{ce} + P_{de} \le 1$

618) $P_{ab} - P_{ac} + P_{be} - P_{cd} + P_{de} \le 1$

619) $P_{ab} - P_{ac} + P_{be} - P_{cd} + P_{ce} \le 1$

620) $P_{ab} - P_{ac} + P_{be} - P_{ce} + P_{de} \le 1$

621) $P_{ab} - P_{ac} + P_{bd} - P_{be} + P_{de} \le 1$

622) $P_{ab} - P_{ac} + P_{bd} - P_{be} + P_{ce} \le 1$

623) $P_{ab} - P_{ac} + P_{bd} - P_{cd} + P_{de} \le 1$

624) $P_{ab} - P_{ac} + P_{bd} - P_{cd} + P_{ce} \le 1$

625) $P_{ab} - P_{ac} + P_{bd} - P_{ce} + P_{de} \le 1$

626) $P_{ab} - P_{ac} + P_{bc} - P_{bd} + P_{de} \le 1$

627) $P_{ab} - P_{ac} + P_{bc} - P_{bd} + P_{ce} \le 1$

628) $P_{ab} - P_{ac} + P_{bc} - P_{bd} + P_{cd} \le 1$

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\begin{array}{lrcccccccccl}
629) & P_{ab} - P_{ac} & & & + P_{bc} - P_{bd} + P_{be} & & & & & & & \leq 1 \\
630) & P_{ab} - P_{ac} & & & + P_{bc} & & - P_{be} & & & & + P_{de} & \leq 1 \\
631) & P_{ab} - P_{ac} & & & + P_{bc} & & - P_{be} & & + P_{ce} & & & \leq 1 \\
632) & P_{ab} - P_{ac} & & & + P_{bc} & & & - P_{cd} & & & + P_{de} & \leq 1 \\
633) & P_{ab} - P_{ac} & & & + P_{bc} & & & - P_{cd} & + P_{ce} & & & \leq 1 \\
634) & P_{ab} - P_{ac} & & & + P_{bc} & & & & - P_{ce} & & + P_{de} & \leq 1 \\
635) & P_{ab} - P_{ac} & & + P_{ae} & & - P_{bd} & & & & & + P_{de} & \leq 1 \\
636) & P_{ab} - P_{ac} & & + P_{ae} & & - P_{bd} & & & + P_{ce} & & & \leq 1 \\
637) & P_{ab} - P_{ac} & & + P_{ae} & & - P_{bd} & & + P_{cd} & & & & \leq 1 \\
638) & P_{ab} - P_{ac} & & + P_{ae} & & - P_{bd} + P_{be} & & & & & & \leq 1 \\
639) & P_{ab} - P_{ac} & & + P_{ae} & & & - P_{be} & & & & + P_{de} & \leq 1 \\
640) & P_{ab} - P_{ac} & & + P_{ae} & & & - P_{be} & & + P_{ce} & & & \leq 1 \\
641) & P_{ab} - P_{ac} & & + P_{ae} & & & & - P_{cd} & & & + P_{de} & \leq 1 \\
642) & P_{ab} - P_{ac} & & + P_{ae} & & & & - P_{cd} & + P_{ce} & & & \leq 1 \\
643) & P_{ab} - P_{ac} & & + P_{ae} & & & & & - P_{ce} & & + P_{de} & \leq 1 \\
644) & P_{ab} - P_{ac} + P_{ad} - P_{ae} & & & & & & & & & + P_{de} & \leq 1 \\
645) & P_{ab} - P_{ac} + P_{ad} - P_{ae} & & & & & & & + P_{ce} & & & \leq 1 \\
646) & P_{ab} - P_{ac} + P_{ad} - P_{ae} & & & & & & + P_{cd} & & & & \leq 1 \\
647) & P_{ab} - P_{ac} + P_{ad} - P_{ae} & & & & & + P_{be} & & & & & \leq 1 \\
648) & P_{ab} - P_{ac} + P_{ad} - P_{ae} & & & & + P_{bd} & & & & & & \leq 1 \\
649) & P_{ab} - P_{ac} + P_{ad} & & & - P_{bc} & & & & & & + P_{de} & \leq 1 \\
650) & P_{ab} - P_{ac} + P_{ad} & & & - P_{bc} & & & & + P_{ce} & & & \leq 1 \\
651) & P_{ab} - P_{ac} + P_{ad} & & & - P_{bc} & & & + P_{cd} & & & & \leq 1 \\
652) & P_{ab} - P_{ac} + P_{ad} & & & - P_{bc} & & + P_{be} & & & & & \leq 1 \\
653) & P_{ab} - P_{ac} + P_{ad} & & & - P_{bc} + P_{bd} & & & & & & & \leq 1 \\
654) & P_{ab} - P_{ac} + P_{ad} & & & & - P_{bd} & & & & & + P_{de} & \leq 1 \\
655) & P_{ab} - P_{ac} + P_{ad} & & & & - P_{bd} & & & + P_{ce} & & & \leq 1 \\
656) & P_{ab} - P_{ac} + P_{ad} & & & & - P_{bd} & & + P_{cd} & & & & \leq 1 \\
657) & P_{ab} - P_{ac} + P_{ad} & & & & - P_{bd} + P_{be} & & & & & & \leq 1 \\
658) & P_{ab} - P_{ac} + P_{ad} & & & & & - P_{be} & & & & + P_{de} & \leq 1 \\
659) & P_{ab} - P_{ac} + P_{ad} & & & & & - P_{be} & & + P_{ce} & & & \leq 1 \\
660) & P_{ab} - P_{ac} + P_{ad} & & & & & & - P_{cd} & & & + P_{de} & \leq 1 \\
661) & P_{ab} - P_{ac} + P_{ad} & & & & & & - P_{cd} & + P_{ce} & & & \leq 1 \\
662) & P_{ab} - P_{ac} + P_{ad} & & & & & & & - P_{ce} & & + P_{de} & \leq 1 \\
663) & P_{ab} - P_{ac} + P_{ad} + P_{ae} - P_{bc} & & & & & & & & & & \leq 1 \\
664) & P_{ab} & - P_{ad} & & & & & & + P_{cd} - P_{ce} & & + P_{de} & \leq 1 \\
665) & P_{ab} & - P_{ad} & & & & & + P_{be} - P_{cd} & & & + P_{de} & \leq 1 \\
666) & P_{ab} & - P_{ad} & & & & & + P_{be} - P_{cd} & + P_{ce} & & & \leq 1 \\
667) & P_{ab} & - P_{ad} & & & & & + P_{be} & - P_{ce} & & + P_{de} & \leq 1 \\
668) & P_{ab} & - P_{ad} & & & + P_{bd} - P_{be} & & & & & + P_{de} & \leq 1 \\
669) & P_{ab} & - P_{ad} & & & + P_{bd} - P_{be} & & & + P_{ce} & & & \leq 1 \\
670) & P_{ab} & - P_{ad} & & & + P_{bd} & & - P_{cd} & & & + P_{de} & \leq 1 \\
671) & P_{ab} & - P_{ad} & & & + P_{bd} & & - P_{cd} & + P_{ce} & & & \leq 1 \\
672) & P_{ab} & - P_{ad} & & & + P_{bd} & & & - P_{ce} & & + P_{de} & \leq 1 \\
673) & P_{ab} & - P_{ad} + P_{ae} & & & - P_{bd} & & & & & + P_{de} & \leq 1 \\
674) & P_{ab} & - P_{ad} + P_{ae} & & & - P_{bd} & & & + P_{ce} & & & \leq 1 \\
675) & P_{ab} & - P_{ad} + P_{ae} & & & - P_{bd} & & + P_{cd} & & & & \leq 1 \\
676) & P_{ab} & - P_{ad} + P_{ae} & & & - P_{bd} + P_{be} & & & & & & \leq 1
\end{array}
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\begin{array}{lrcccccccl}
677) & P_{ab} & - P_{ad} + P_{ae} & & - P_{be} & & & + P_{de} & \leq 1 \\
678) & P_{ab} & - P_{ad} + P_{ae} & & - P_{be} & & + P_{ce} & & \leq 1 \\
679) & P_{ab} & - P_{ad} + P_{ae} & & & - P_{cd} & & + P_{de} & \leq 1 \\
680) & P_{ab} & - P_{ad} + P_{ae} & & & - P_{cd} + P_{ce} & & & \leq 1 \\
681) & P_{ab} & - P_{ad} + P_{ae} & & & & - P_{ce} & + P_{de} & \leq 1 \\
682) & P_{ab} & - P_{ae} & & & + P_{cd} & - P_{ce} & + P_{de} & \leq 1 \\
683) & P_{ab} & - P_{ae} & & + P_{be} & - P_{cd} & & + P_{de} & \leq 1 \\
684) & P_{ab} & - P_{ae} & & + P_{be} & - P_{cd} + P_{ce} & & & \leq 1 \\
685) & P_{ab} & - P_{ae} & & + P_{be} & & - P_{ce} & + P_{de} & \leq 1 \\
686) & P_{ab} & - P_{ae} & + P_{bd} & - P_{be} & & & + P_{de} & \leq 1 \\
687) & P_{ab} & - P_{ae} & + P_{bd} & - P_{be} & & + P_{ce} & & \leq 1 \\
688) & P_{ab} & - P_{ae} & + P_{bd} & & - P_{cd} & & + P_{de} & \leq 1 \\
689) & P_{ab} & - P_{ae} & + P_{bd} & & - P_{cd} + P_{ce} & & & \leq 1 \\
690) & P_{ab} & - P_{ae} & + P_{bd} & & & - P_{ce} & + P_{de} & \leq 1 \\
691) & P_{ab} & & - P_{bc} & & + P_{cd} & - P_{ce} & + P_{de} & \leq 1 \\
692) & P_{ab} & & - P_{bc} & + P_{be} & - P_{cd} & & + P_{de} & \leq 1 \\
693) & P_{ab} & & - P_{bc} & + P_{be} & - P_{cd} + P_{ce} & & & \leq 1 \\
694) & P_{ab} & & - P_{bc} & + P_{be} & & - P_{ce} & + P_{de} & \leq 1 \\
695) & P_{ab} & & - P_{bc} + P_{bd} & - P_{be} & & & + P_{de} & \leq 1 \\
696) & P_{ab} & & - P_{bc} + P_{bd} & - P_{be} & & + P_{ce} & & \leq 1 \\
697) & P_{ab} & & - P_{bc} + P_{bd} & & - P_{cd} & & + P_{de} & \leq 1 \\
698) & P_{ab} & & - P_{bc} + P_{bd} & & - P_{cd} + P_{ce} & & & \leq 1 \\
699) & P_{ab} & & - P_{bc} + P_{bd} & & & - P_{ce} & + P_{de} & \leq 1 \\
700) & P_{ab} & & & - P_{bd} & + P_{cd} & - P_{ce} & + P_{de} & \leq 1 \\
701) & P_{ab} & & & - P_{bd} + P_{be} & - P_{cd} & & + P_{de} & \leq 1 \\
702) & P_{ab} & & & - P_{bd} + P_{be} & - P_{cd} + P_{ce} & & & \leq 1 \\
703) & P_{ab} & & & - P_{bd} + P_{be} & & - P_{ce} & + P_{de} & \leq 1 \\
704) & P_{ab} & & + P_{ae} - P_{bc} - P_{bd} & & & & + P_{de} & \leq 1 \\
705) & P_{ab} & & + P_{ae} - P_{bc} - P_{bd} & & & + P_{ce} & & \leq 1 \\
706) & P_{ab} & & + P_{ae} - P_{bc} - P_{bd} & & + P_{cd} & & & \leq 1 \\
707) & P_{ab} & & + P_{ae} - P_{bc} - P_{bd} + P_{be} & & & & & \leq 1 \\
708) & P_{ab} & & + P_{ae} - P_{bc} & - P_{be} & & & + P_{de} & \leq 1 \\
709) & P_{ab} & & + P_{ae} - P_{bc} & - P_{be} & & + P_{ce} & & \leq 1 \\
710) & P_{ab} & & + P_{ae} - P_{bc} & & - P_{cd} & & + P_{de} & \leq 1 \\
711) & P_{ab} & & + P_{ae} - P_{bc} & & - P_{cd} + P_{ce} & & & \leq 1 \\
712) & P_{ab} & & + P_{ae} - P_{bc} & & & - P_{ce} & + P_{de} & \leq 1 \\
713) & & P_{ad} + P_{ae} - P_{bc} - P_{bd} & & & + P_{cd} & - P_{ce} & + P_{de} & \leq 1 \\
714) & & P_{ad} + P_{ae} - P_{bc} - P_{bd} + P_{be} & & - P_{cd} & & & + P_{de} & \leq 1 \\
715) & & P_{ad} + P_{ae} - P_{bc} - P_{bd} + P_{be} & & - P_{cd} + P_{ce} & & & & \leq 1 \\
716) & & P_{ad} + P_{ae} - P_{bc} - P_{bd} + P_{be} & & & & - P_{ce} & + P_{de} & \leq 1 \\
717) & P_{ac} - P_{ad} + P_{ae} & & - P_{bd} & & + P_{cd} & - P_{ce} & + P_{de} & \leq 1 \\
718) & P_{ac} - P_{ad} + P_{ae} & & - P_{bd} + P_{be} & - P_{cd} & & & + P_{de} & \leq 1 \\
719) & P_{ac} - P_{ad} + P_{ae} & & - P_{bd} + P_{be} & - P_{cd} + P_{ce} & & & & \leq 1 \\
720) & P_{ac} - P_{ad} + P_{ae} & & - P_{bd} + P_{be} & & & - P_{ce} & + P_{de} & \leq 1 \\
721) & P_{ac} & + P_{ae} - P_{bc} - P_{bd} & & & + P_{cd} & - P_{ce} & + P_{de} & \leq 1 \\
722) & P_{ac} & + P_{ae} - P_{bc} - P_{bd} + P_{be} & & - P_{cd} & & & + P_{de} & \leq 1 \\
723) & P_{ac} & + P_{ae} - P_{bc} - P_{bd} + P_{be} & & - P_{cd} + P_{ce} & & & & \leq 1 \\
724) & P_{ac} & + P_{ae} - P_{bc} - P_{bd} + P_{be} & & & & - P_{ce} & + P_{de} & \leq 1
\end{array}
$$

725) $P_{ab} - P_{ac} - P_{ae} + P_{bc} + P_{cd} - P_{ce} + P_{de} \leq 1$
726) $P_{ab} - P_{ac} - P_{ae} + P_{bc} + P_{be} - P_{cd} + P_{de} \leq 1$
727) $P_{ab} - P_{ac} - P_{ae} + P_{bc} + P_{be} - P_{cd} + P_{ce} \leq 1$
728) $P_{ab} - P_{ac} - P_{ae} + P_{bc} + P_{be} - P_{ce} + P_{de} \leq 1$
729) $P_{ab} - P_{ac} - P_{ae} + P_{bc} + P_{bd} - P_{be} + P_{de} \leq 1$
730) $P_{ab} - P_{ac} - P_{ae} + P_{bc} + P_{bd} - P_{be} + P_{ce} \leq 1$
731) $P_{ab} - P_{ac} - P_{ae} + P_{bc} + P_{bd} - P_{cd} + P_{de} \leq 1$
732) $P_{ab} - P_{ac} - P_{ae} + P_{bc} + P_{bd} - P_{cd} + P_{ce} \leq 1$
733) $P_{ab} - P_{ac} - P_{ae} + P_{bc} + P_{bd} - P_{ce} + P_{de} \leq 1$
734) $P_{ab} - P_{ac} + P_{bc} - P_{bd} + P_{cd} - P_{ce} + P_{de} \leq 1$
735) $P_{ab} - P_{ac} + P_{bc} - P_{bd} + P_{be} - P_{cd} + P_{de} \leq 1$
736) $P_{ab} - P_{ac} + P_{bc} - P_{bd} + P_{be} - P_{cd} + P_{ce} \leq 1$
737) $P_{ab} - P_{ac} + P_{bc} - P_{bd} + P_{be} - P_{ce} + P_{de} \leq 1$
738) $P_{ab} - P_{ac} + P_{ae} - P_{bd} + P_{cd} - P_{ce} + P_{de} \leq 1$
739) $P_{ab} - P_{ac} + P_{ae} - P_{bd} + P_{be} - P_{cd} + P_{de} \leq 1$
740) $P_{ab} - P_{ac} + P_{ae} - P_{bd} + P_{be} - P_{cd} + P_{ce} \leq 1$
741) $P_{ab} - P_{ac} + P_{ae} - P_{bd} + P_{be} - P_{ce} + P_{de} \leq 1$
742) $P_{ab} - P_{ac} + P_{ad} - P_{ae} + P_{cd} - P_{ce} + P_{de} \leq 1$
743) $P_{ab} - P_{ac} + P_{ad} - P_{ae} + P_{be} - P_{cd} + P_{de} \leq 1$
744) $P_{ab} - P_{ac} + P_{ad} - P_{ae} + P_{be} - P_{cd} + P_{ce} \leq 1$
745) $P_{ab} - P_{ac} + P_{ad} - P_{ae} + P_{be} - P_{ce} + P_{de} \leq 1$
746) $P_{ab} - P_{ac} + P_{ad} - P_{ae} + P_{bd} - P_{be} + P_{de} \leq 1$
747) $P_{ab} - P_{ac} + P_{ad} - P_{ae} + P_{bd} - P_{be} + P_{ce} \leq 1$
748) $P_{ab} - P_{ac} + P_{ad} - P_{ae} + P_{bd} - P_{cd} + P_{de} \leq 1$
749) $P_{ab} - P_{ac} + P_{ad} - P_{ae} + P_{bd} - P_{cd} + P_{ce} \leq 1$
750) $P_{ab} - P_{ac} + P_{ad} - P_{ae} + P_{bd} - P_{ce} + P_{de} \leq 1$
751) $P_{ab} - P_{ac} + P_{ad} - P_{bc} + P_{cd} - P_{ce} + P_{de} \leq 1$
752) $P_{ab} - P_{ac} + P_{ad} - P_{bc} + P_{be} - P_{cd} + P_{de} \leq 1$
753) $P_{ab} - P_{ac} + P_{ad} - P_{bc} + P_{be} - P_{cd} + P_{ce} \leq 1$
754) $P_{ab} - P_{ac} + P_{ad} - P_{bc} + P_{be} - P_{ce} + P_{de} \leq 1$
755) $P_{ab} - P_{ac} + P_{ad} - P_{bc} + P_{bd} - P_{be} + P_{de} \leq 1$
756) $P_{ab} - P_{ac} + P_{ad} - P_{bc} + P_{bd} - P_{be} + P_{ce} \leq 1$
757) $P_{ab} - P_{ac} + P_{ad} - P_{bc} + P_{bd} - P_{cd} + P_{de} \leq 1$
758) $P_{ab} - P_{ac} + P_{ad} - P_{bc} + P_{bd} - P_{cd} + P_{ce} \leq 1$
759) $P_{ab} - P_{ac} + P_{ad} - P_{bc} + P_{bd} - P_{ce} + P_{de} \leq 1$
760) $P_{ab} - P_{ac} + P_{ad} - P_{bd} + P_{cd} - P_{ce} + P_{de} \leq 1$
761) $P_{ab} - P_{ac} + P_{ad} - P_{bd} + P_{be} - P_{cd} + P_{de} \leq 1$
762) $P_{ab} - P_{ac} + P_{ad} - P_{bd} + P_{be} - P_{cd} + P_{ce} \leq 1$
763) $P_{ab} - P_{ac} + P_{ad} - P_{bd} + P_{be} - P_{ce} + P_{de} \leq 1$
764) $P_{ab} - P_{ac} + P_{ad} + P_{ae} - P_{bc} - P_{bd} + P_{de} \leq 1$
765) $P_{ab} - P_{ac} + P_{ad} + P_{ae} - P_{bc} - P_{bd} + P_{ce} \leq 1$
766) $P_{ab} - P_{ac} + P_{ad} + P_{ae} - P_{bc} - P_{bd} + P_{cd} \leq 1$
767) $P_{ab} - P_{ac} + P_{ad} + P_{ae} - P_{bc} - P_{bd} + P_{be} \leq 1$
768) $P_{ab} - P_{ac} + P_{ad} + P_{ae} - P_{bc} - P_{be} + P_{de} \leq 1$
769) $P_{ab} - P_{ac} + P_{ad} + P_{ae} - P_{bc} - P_{be} + P_{ce} \leq 1$
770) $P_{ab} - P_{ac} + P_{ad} + P_{ae} - P_{bc} - P_{cd} + P_{de} \leq 1$
771) $P_{ab} - P_{ac} + P_{ad} + P_{ae} - P_{bc} - P_{cd} + P_{ce} \leq 1$
772) $P_{ab} - P_{ac} + P_{ad} + P_{ae} - P_{bc} - P_{ce} + P_{de} \leq 1$

773) $P_{ab} - P_{ad} + P_{ae} - P_{bd} + P_{cd} - P_{ce} + P_{de} \leq 1$
774) $P_{ab} - P_{ad} + P_{ae} - P_{bd} + P_{be} - P_{cd} + P_{de} \leq 1$
775) $P_{ab} - P_{ad} + P_{ae} - P_{bd} + P_{be} - P_{cd} + P_{ce} \leq 1$
776) $P_{ab} - P_{ad} + P_{ae} - P_{bd} + P_{be} - P_{ce} + P_{de} \leq 1$
777) $P_{ab} + P_{ae} - P_{bc} - P_{bd} + P_{cd} - P_{ce} + P_{de} \leq 1$
778) $P_{ab} + P_{ae} - P_{bc} - P_{bd} + P_{be} - P_{cd} + P_{de} \leq 1$
779) $P_{ab} + P_{ae} - P_{bc} - P_{bd} + P_{be} - P_{cd} + P_{ce} \leq 1$
780) $P_{ab} + P_{ae} - P_{bc} - P_{bd} + P_{be} - P_{ce} + P_{de} \leq 1$
781) $P_{ab} - P_{ac} + P_{ad} + P_{ae} - P_{bc} - P_{bd} + P_{cd} - P_{ce} + P_{de} \leq 1$
782) $P_{ab} - P_{ac} + P_{ad} + P_{ae} - P_{bc} - P_{bd} + P_{be} - P_{cd} + P_{de} \leq 1$
783) $P_{ab} - P_{ac} + P_{ad} + P_{ae} - P_{bc} - P_{bd} + P_{be} - P_{cd} + P_{ce} \leq 1$
784) $P_{ab} - P_{ac} + P_{ad} + P_{ae} - P_{bc} - P_{bd} + P_{be} - P_{ce} + P_{de} \leq 1$

4 Facet-defining inequalities for Cash I, Random $\mathcal{CPT} - \mathcal{GE}$

$$0 \leq P_{ab} \leq P_{ac} \leq P_{ad} \leq P_{bc} \leq P_{ae} \leq P_{bd} \leq P_{be} \leq P_{cd} \leq P_{ce} \leq P_{de} \leq 1$$

5 Facet-defining inequalities for Cash II, Random $\mathcal{CPT} - \mathcal{KT}$

$$0 \leq P_{DE} \leq P_{CE} \leq P_{CD} \leq P_{BE} \leq P_{BD} \leq P_{AE} \begin{matrix} \leq P_{AD} \leq \\ \leq P_{BC} \leq \end{matrix} P_{AC} \leq P_{AB} \leq 1.$$

6 Facet-defining inequalities for Cash II, Random $\mathcal{CPT} - \mathcal{GE}$

$1 - 20)$ $0 \leq P_{ij} \leq 1$ for all distinct i and j in the set of lotteries $\{A, B, C, D, E\}$.
21) $-P_{AB} + P_{AE} - P_{BD} \leq 0$
22) $-P_{AB} + P_{AE} - P_{BE} \leq 0$
23) $-P_{AB} + P_{AD} - P_{BC} \leq 0$
24) $-P_{AB} + P_{AD} - P_{BD} \leq 0$
25) $-P_{AB} + P_{AC} - P_{BC} \leq 0$
26) $-P_{AC} + P_{AE} - P_{BD} \leq 0$
27) $-P_{AC} + P_{AE} - P_{BE} \leq 0$
28) $-P_{AC} + P_{AE} - P_{CD} \leq 0$
29) $-P_{AC} + P_{AE} - P_{CE} \leq 0$
30) $-P_{AC} + P_{AD} - P_{AE} \leq 0$
31) $-P_{AC} + P_{AD} - P_{BC} \leq 0$
32) $-P_{AC} + P_{AD} - P_{BD} \leq 0$
33) $-P_{AC} + P_{AD} - P_{BE} \leq 0$
34) $-P_{AC} + P_{AD} - P_{CD} \leq 0$
35) $-P_{AC} + P_{AD} - P_{CE} \leq 0$
36) $-P_{AD} + P_{AE} - P_{BD} \leq 0$
37) $-P_{AD} + P_{AE} - P_{BE} \leq 0$
38) $-P_{AD} + P_{AE} - P_{DE} \leq 0$
39) $-P_{BC} + P_{CE} - P_{DE} \leq 0$

40) $-P_{BC} + P_{CD} - P_{CE} \leq 0$

41) $-P_{BC} + P_{CD} - P_{DE} \leq 0$

42) $-P_{BC} + P_{BE} - P_{CE} \leq 0$

43) $-P_{BC} + P_{BE} - P_{DE} \leq 0$

44) $-P_{BC} + P_{BD} - P_{BE} \leq 0$

45) $-P_{BC} + P_{BD} - P_{CD} \leq 0$

46) $-P_{BC} + P_{BD} - P_{CE} \leq 0$

47) $-P_{BC} + P_{BD} - P_{DE} \leq 0$

48) $-P_{BD} + P_{CE} - P_{DE} \leq 0$

49) $-P_{BD} + P_{CD} - P_{CE} \leq 0$

50) $-P_{BD} + P_{CD} - P_{DE} \leq 0$

51) $-P_{BD} + P_{BE} - P_{CE} \leq 0$

52) $-P_{BD} + P_{BE} - P_{DE} \leq 0$

53) $-P_{BE} + P_{CE} - P_{DE} \leq 0$

54) $-P_{CD} + P_{CE} - P_{DE} \leq 0$

55) $P_{AE} - P_{BC} - P_{BD} \leq 0$

56) $P_{AE} - P_{BC} - P_{BE} \leq 0$

57) $P_{AE} - P_{BC} - P_{CD} \leq 0$

58) $P_{AE} - P_{BC} - P_{CE} \leq 0$

59) $P_{AE} - P_{BC} - P_{DE} \leq 0$

60) $-P_{AC} + P_{BE} - P_{CD} - P_{CE} \leq 0$

61) $-P_{AC} + P_{BE} - P_{CD} - P_{DE} \leq 0$

62) $-P_{AB} + P_{AD} + P_{AE} - P_{BC} - P_{BD} \leq 0$

63) $-P_{AB} + P_{AD} + P_{AE} - P_{BC} - P_{BE} \leq 0$

64) $-P_{AB} + P_{AC} + P_{AE} - P_{BC} - P_{BD} \leq 0$

65) $-P_{AB} + P_{AC} + P_{AE} - P_{BC} - P_{BE} \leq 0$

66) $-P_{AC} + P_{AE} - P_{BD} + P_{CD} - P_{CE} \leq 0$

67) $-P_{AC} + P_{AE} - P_{BD} + P_{BE} - P_{CE} \leq 0$

68) $-P_{AC} + P_{AD} - P_{BC} + P_{CD} - P_{CE} \leq 0$

69) $-P_{AC} + P_{AD} - P_{BC} + P_{BE} - P_{CE} \leq 0$

70) $-P_{AC} + P_{AD} - P_{BC} + P_{BD} - P_{BE} \leq 0$

71) $-P_{AC} + P_{AD} - P_{BC} + P_{BD} - P_{CD} \leq 0$

72) $-P_{AC} + P_{AD} - P_{BC} + P_{BD} - P_{CE} \leq 0$

73) $-P_{AC} + P_{AD} - P_{BD} + P_{CD} - P_{CE} \leq 0$

74) $-P_{AC} + P_{AD} - P_{BD} + P_{BE} - P_{CE} \leq 0$

75) $-P_{AC} + P_{AD} + P_{AE} - P_{BC} - P_{BD} \leq 0$

76) $-P_{AC} + P_{AD} + P_{AE} - P_{BC} - P_{BE} \leq 0$

77) $-P_{AC} + P_{AD} + P_{AE} - P_{BC} - P_{CD} \leq 0$

78) $-P_{AC} + P_{AD} + P_{AE} - P_{BC} - P_{CE} \leq 0$

79) $-P_{AD} + P_{AE} - P_{BD} + P_{CE} - P_{DE} \leq 0$

80) $-P_{AD} + P_{AE} - P_{BD} + P_{CD} - P_{CE} \leq 0$

81) $-P_{AD} + P_{AE} - P_{BD} + P_{CD} - P_{DE} \leq 0$

82) $-P_{AD} + P_{AE} - P_{BD} + P_{BE} - P_{DE} \leq 0$

83) $-P_{AD} + P_{AE} - P_{BE} + P_{CE} - P_{DE} \leq 0$

84) $-P_{AD} + P_{AE} - P_{CD} + P_{CE} - P_{DE} \leq 0$

85) $-P_{BC} + P_{BD} - P_{BE} + P_{CE} - P_{DE} \leq 0$

86) $-P_{BC} + P_{BD} - P_{CD} + P_{CE} - P_{DE} \leq 0$

87) $P_{AE} - P_{BC} - P_{BD} + P_{CE} - P_{DE} \leq 0$

$$
\begin{aligned}
88)\quad & P_{AE} - P_{BC} - P_{BD} + P_{CD} - P_{CE} \le 0\\
89)\quad & P_{AE} - P_{BC} - P_{BD} + P_{CD} - P_{DE} \le 0\\
90)\quad & P_{AE} - P_{BC} - P_{BD} + P_{BE} - P_{CE} \le 0\\
91)\quad & P_{AE} - P_{BC} - P_{BD} + P_{BE} - P_{DE} \le 0\\
92)\quad & P_{AE} - P_{BC} - P_{BE} + P_{CE} - P_{DE} \le 0\\
93)\quad & P_{AE} - P_{BC} - P_{BE} + P_{CD} - P_{CE} \le 0\\
94)\quad & P_{AE} - P_{BC} - P_{BE} + P_{CD} - P_{DE} \le 0\\
95)\quad & P_{AE} - P_{BC} - P_{CD} + P_{CE} - P_{DE} \le 0\\
96)\quad & -P_{AB} + P_{AD} - P_{AE} - P_{BC} + P_{CE} - P_{DE} \le 0\\
97)\quad & -P_{AB} + P_{AD} - P_{AE} - P_{BD} + P_{CE} - P_{DE} \le 0\\
98)\quad & -P_{AB} + P_{AD} - P_{BD} - P_{BE} + P_{CD} - P_{CE} \le 0\\
99)\quad & -P_{AB} + P_{AD} - P_{BD} - P_{BE} + P_{CD} - P_{DE} \le 0\\
100)\quad & -P_{AB} + P_{AC} - P_{AD} - P_{BC} + P_{CE} - P_{DE} \le 0\\
101)\quad & -P_{AB} + P_{AC} - P_{AD} - P_{BC} + P_{CD} - P_{CE} \le 0\\
102)\quad & -P_{AB} + P_{AC} - P_{AD} - P_{BC} + P_{CD} - P_{DE} \le 0\\
103)\quad & -P_{AB} + P_{AC} - P_{AE} - P_{BC} + P_{CE} - P_{DE} \le 0\\
104)\quad & -P_{AB} + P_{AC} - P_{BC} - P_{BE} + P_{CD} - P_{CE} \le 0\\
105)\quad & -P_{AB} + P_{AC} - P_{BC} - P_{BE} + P_{CD} - P_{DE} \le 0\\
106)\quad & -P_{AC} - P_{AD} + P_{AE} + P_{BE} - P_{CD} - P_{DE} \le 0\\
107)\quad & -P_{AC} - P_{BC} + P_{BD} + P_{BE} - P_{CD} - P_{CE} \le 0\\
108)\quad & -P_{AC} - P_{BC} + P_{BD} + P_{BE} - P_{CD} - P_{DE} \le 0\\
109)\quad & -P_{AC} + P_{AD} + P_{AE} - P_{BC} - P_{BD} + P_{CD} - P_{CE} \le 0\\
110)\quad & -P_{AC} + P_{AD} + P_{AE} - P_{BC} - P_{BD} + P_{BE} - P_{CE} \le 0\\
111)\quad & -P_{AC} + P_{AD} + P_{AE} - P_{BC} - P_{BE} + P_{CD} - P_{CE} \le 0\\
112)\quad & -P_{AB} - P_{AC} + 2P_{AD} - P_{BD} - P_{BE} + P_{CD} - P_{CE} \le 0\\
113)\quad & -2P_{AC} + P_{AE} + P_{BE} - P_{CD} - P_{CE} \le 0\\
114)\quad & -2P_{AC} + P_{AD} + P_{BE} - P_{CD} - P_{CE} \le 0\\
115)\quad & -P_{AD} + 2P_{AE} - P_{BC} - P_{BE} + P_{CD} - 2P_{CE} \le 0\\
116)\quad & -P_{AB} + P_{AD} - 2P_{BC} + P_{BD} - P_{BE} + P_{CD} - P_{DE} \le 0\\
117)\quad & -P_{AB} + P_{AD} + P_{AE} - P_{BC} - 2P_{BE} + P_{CD} - P_{DE} \le 0\\
118)\quad & -P_{AB} + P_{AC} - 2P_{BC} + P_{BD} - P_{BE} + P_{CD} - P_{CE} \le 0\\
119)\quad & -P_{AB} + P_{AC} - 2P_{BC} + P_{BD} - P_{BE} + P_{CD} - P_{DE} \le 0\\
120)\quad & -P_{AB} + P_{AC} + P_{AE} - P_{BC} - 2P_{BE} + P_{CD} - P_{CE} \le 0\\
121)\quad & -P_{AB} + P_{AC} + P_{AE} - P_{BC} - 2P_{BE} + P_{CD} - P_{DE} \le 0\\
122)\quad & -2P_{AC} + P_{AD} - P_{BC} + P_{BD} + P_{BE} - P_{CD} - P_{CE} \le 0\\
123)\quad & -P_{AB} - P_{AC} + 2P_{AD} - 2P_{BC} + P_{BD} - P_{BE} + P_{CD} - P_{CE} \le 0\\
124)\quad & -P_{AB} - P_{AC} + 2P_{AD} + P_{AE} - P_{BC} - 2P_{BE} + P_{CD} - P_{CE} \le 0\\
125)\quad & -P_{AB} + P_{AC} - P_{AD} + 2P_{AE} - P_{BC} - 2P_{BE} + P_{CD} - P_{CE} \le 0\\
126)\quad & -P_{AB} + P_{AC} - P_{AD} + 2P_{AE} - P_{BC} - 2P_{BE} + P_{CD} - P_{DE} \le 0\\
127)\quad & -P_{AB} + P_{AD} - P_{AE} - P_{BD} - P_{BE} + P_{CD} + P_{CE} - 2P_{DE} \le 0\\
128)\quad & -P_{AB} + P_{AC} - P_{AE} - P_{BC} - P_{BE} + P_{CD} + P_{CE} - 2P_{DE} \le 0\\
129)\quad & -P_{AB} + P_{AD} + P_{AE} - 2P_{BC} + P_{BD} - 2P_{BE} + P_{CD} - P_{DE} \le 0\\
130)\quad & -P_{AB} + P_{AC} + P_{AE} - 2P_{BC} + P_{BD} - 2P_{BE} + P_{CD} - P_{CE} \le 0\\
131)\quad & -P_{AB} + P_{AC} + P_{AE} - 2P_{BC} + P_{BD} - 2P_{BE} + P_{CD} - P_{DE} \le 0\\
132)\quad & -P_{AB} - P_{AC} + 2P_{AD} + P_{AE} - 2P_{BC} + P_{BD} - 2P_{BE} + P_{CD} - P_{CE} \le 0\\
133)\quad & -P_{AB} + P_{AD} - P_{AE} - 2P_{BC} + P_{BD} - P_{BE} + P_{CD} + P_{CE} - 2P_{DE} \le 0\\
134)\quad & -P_{AB} + P_{AC} - P_{AE} - 2P_{BC} + P_{BD} - P_{BE} + P_{CD} + P_{CE} - 2P_{DE} \le 0\\
135)\quad & P_{CD} - P_{CE} + P_{DE} \le 1
\end{aligned}
$$

136) $P_{BD} - P_{BE} + P_{DE} \leq 1$
137) $P_{BD} - P_{BE} + P_{CE} \leq 1$
138) $P_{BC} - P_{BD} + P_{CD} \leq 1$
139) $P_{BC} - P_{BE} + P_{DE} \leq 1$
140) $P_{BC} - P_{BE} + P_{CE} \leq 1$
141) $P_{AE} - P_{BD} + P_{DE} \leq 1$
142) $P_{AE} - P_{BD} + P_{CE} \leq 1$
143) $P_{AE} - P_{BD} + P_{CD} \leq 1$
144) $P_{AE} - P_{BD} + P_{BE} \leq 1$
145) $P_{AE} - P_{BE} + P_{DE} \leq 1$
146) $P_{AE} - P_{BE} + P_{CE} \leq 1$
147) $P_{AE} - P_{BE} + P_{CD} \leq 1$
148) $P_{AD} - P_{AE} + P_{DE} \leq 1$
149) $P_{AD} - P_{AE} + P_{CE} \leq 1$
150) $P_{AD} - P_{BC} + P_{DE} \leq 1$
151) $P_{AD} - P_{BC} + P_{CE} \leq 1$
152) $P_{AD} - P_{BC} + P_{CD} \leq 1$
153) $P_{AD} - P_{BC} + P_{BE} \leq 1$
154) $P_{AD} - P_{BC} + P_{BD} \leq 1$
155) $P_{AD} - P_{BD} + P_{DE} \leq 1$
156) $P_{AD} - P_{BD} + P_{CE} \leq 1$
157) $P_{AD} - P_{BD} + P_{CD} \leq 1$
158) $P_{AD} - P_{BD} + P_{BE} \leq 1$
159) $P_{AD} - P_{BE} + P_{DE} \leq 1$
160) $P_{AD} - P_{BE} + P_{CE} \leq 1$
161) $P_{AD} - P_{BE} + P_{CD} \leq 1$
162) $P_{AD} - P_{CE} + P_{DE} \leq 1$
163) $P_{AD} + P_{AE} - P_{BC} \leq 1$
164) $P_{AC} - P_{AD} + P_{CE} \leq 1$
165) $P_{AC} - P_{AD} + P_{CD} \leq 1$
166) $P_{AC} - P_{AE} + P_{DE} \leq 1$
167) $P_{AC} - P_{AE} + P_{CE} \leq 1$
168) $P_{AC} - P_{BC} + P_{DE} \leq 1$
169) $P_{AC} - P_{BC} + P_{CE} \leq 1$
170) $P_{AC} - P_{BC} + P_{CD} \leq 1$
171) $P_{AC} - P_{BC} + P_{BE} \leq 1$
172) $P_{AC} - P_{BC} + P_{BD} \leq 1$
173) $P_{AC} - P_{BD} + P_{DE} \leq 1$
174) $P_{AC} - P_{BD} + P_{CE} \leq 1$
175) $P_{AC} - P_{BD} + P_{CD} \leq 1$
176) $P_{AC} - P_{BD} + P_{BE} \leq 1$
177) $P_{AC} - P_{BE} + P_{DE} \leq 1$
178) $P_{AC} - P_{BE} + P_{CE} \leq 1$
179) $P_{AC} - P_{BE} + P_{CD} \leq 1$
180) $P_{AC} + P_{AE} - P_{BC} \leq 1$
181) $P_{AB} - P_{AC} + P_{DE} \leq 1$
182) $P_{AB} - P_{AC} + P_{CE} \leq 1$
183) $P_{AB} - P_{AC} + P_{CD} \leq 1$

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\begin{array}{rlllllllllllllllll}
184) & P_{AB} - & P_{AC} & & & & & & + & P_{BE} & & & & & & \leq 1 \\
185) & P_{AB} - & P_{AC} & & & & & + & P_{BD} & & & & & & \leq 1 \\
186) & P_{AB} - & P_{AC} & & & & + & P_{BC} & & & & & & & \leq 1 \\
187) & P_{AB} - & P_{AC} & & & + & P_{AE} & & & & & & & & \leq 1 \\
188) & P_{AB} - & P_{AC} + & P_{AD} & & & & & & & & & & & \leq 1 \\
189) & P_{AB} & & - & P_{AD} & & & & & & & & & + & P_{DE} \leq 1 \\
190) & P_{AB} & & - & P_{AD} & & & & & & & & + & P_{CE} & \leq 1 \\
191) & P_{AB} & & - & P_{AD} & & & & & & & + & P_{CD} & & \leq 1 \\
192) & P_{AB} & & - & P_{AD} & & & & & & + & P_{BE} & & & \leq 1 \\
193) & P_{AB} & & - & P_{AD} & & & & & + & P_{BD} & & & & \leq 1 \\
194) & P_{AB} & & - & P_{AD} + & P_{AE} & & & & & & & & & \leq 1 \\
195) & P_{AB} & & & - & P_{AE} & & & & & & & & + & P_{DE} \leq 1 \\
196) & P_{AB} & & & - & P_{AE} & & & & & & & + & P_{CE} & \leq 1 \\
197) & P_{AB} & & & - & P_{AE} & & & & & & + & P_{CD} & & \leq 1 \\
198) & P_{AB} & & & - & P_{AE} & & & & & + & P_{BE} & & & \leq 1 \\
199) & P_{AB} & & & & - & P_{BC} & & & & & & & + & P_{DE} \leq 1 \\
200) & P_{AB} & & & & - & P_{BC} & & & & & & + & P_{CE} & \leq 1 \\
201) & P_{AB} & & & & - & P_{BC} & & & & & + & P_{CD} & & \leq 1 \\
202) & P_{AB} & & & & - & P_{BC} & & & & + & P_{BE} & & & \leq 1 \\
203) & P_{AB} & & & & - & P_{BC} + & P_{BD} & & & & & & & \leq 1 \\
204) & P_{AB} & & & & & - & P_{BD} & & & & & & + & P_{DE} \leq 1 \\
205) & P_{AB} & & & & & - & P_{BD} & & & & & + & P_{CE} & \leq 1 \\
206) & P_{AB} & & & & & - & P_{BD} & & & & + & P_{CD} & & \leq 1 \\
207) & P_{AB} & & & & & - & P_{BD} + & P_{BE} & & & & & & \leq 1 \\
208) & P_{AB} & & & & & & - & P_{BE} & & & & & + & P_{DE} \leq 1 \\
209) & P_{AB} & & & & & & - & P_{BE} & & & & + & P_{CE} & \leq 1 \\
210) & P_{AB} & & & & & & - & P_{BE} + & P_{CD} & & & & & \leq 1 \\
211) & P_{AB} & & & & & & & & & & & - & P_{CE} + & P_{DE} \leq 1 \\
212) & P_{AB} & & & & & + & P_{AE} - & P_{BC} & & & & & & \leq 1 \\
213) - & P_{AB} & & & & & + & P_{AE} & & & & & - & P_{CD} + & P_{CE} & \leq 1 \\
214) - & P_{AB} & & & + & P_{AD} & & & & & & & - & P_{CD} & + & P_{DE} \leq 1 \\
215) - & P_{AB} & & & + & P_{AD} & & & & & & & - & P_{CD} + & P_{CE} & \leq 1 \\
216) - & P_{AB} + & P_{AC} & & & & & & & & & & - & P_{CD} + & P_{CE} & \leq 1 \\
217) & & & & & & - & P_{AE} & & + & P_{BD} & & & - & P_{CE} + & P_{DE} \leq 1 \\
218) & & & & & & - & P_{AE} + & P_{BC} & & & & & - & P_{CE} + & P_{DE} \leq 1 \\
219) & & & & & & & & P_{BC} - & P_{BD} & & + & P_{CD} - & P_{CE} + & P_{DE} \leq 1 \\
220) & & & & & & P_{AE} & & - & P_{BD} & & + & P_{CD} - & P_{CE} + & P_{DE} \leq 1 \\
221) & & & & & & P_{AE} & & & & - & P_{BE} + & P_{CD} - & P_{CE} + & P_{DE} \leq 1 \\
222) & & & & P_{AD} & & & - & P_{BC} & & & + & P_{CD} - & P_{CE} + & P_{DE} \leq 1 \\
223) & & & & P_{AD} & & & - & P_{BC} & & + & P_{BE} & - & P_{CE} + & P_{DE} \leq 1 \\
224) & & & & P_{AD} & & & - & P_{BC} + & P_{BD} - & P_{BE} & & & + & P_{DE} \leq 1 \\
225) & & & & P_{AD} & & & - & P_{BC} + & P_{BD} - & P_{BE} & + & P_{CE} & & \leq 1 \\
226) & & & & P_{AD} & & & - & P_{BC} + & P_{BD} - & P_{BE} + & P_{CD} & & & \leq 1 \\
227) & & & & P_{AD} & & & - & P_{BC} + & P_{BD} & & & - & P_{CE} + & P_{DE} \leq 1 \\
228) & & & & P_{AD} & & & & - & P_{BD} & & + & P_{CD} - & P_{CE} + & P_{DE} \leq 1 \\
229) & & & & P_{AD} & & & & - & P_{BD} + & P_{BE} & & - & P_{CE} + & P_{DE} \leq 1 \\
230) & & & & P_{AD} & & & & & - & P_{BE} + & P_{CD} - & P_{CE} + & P_{DE} \leq 1 \\
231) & & & & P_{AD} + & P_{AE} - & P_{BC} - & P_{BD} & & & & & & + & P_{DE} \leq 1
\end{array}
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232) $P_{AD} + P_{AE} - P_{BC} - P_{BD} + P_{CE} \leq 1$
233) $P_{AD} + P_{AE} - P_{BC} - P_{BD} + P_{CD} \leq 1$
234) $P_{AD} + P_{AE} - P_{BC} - P_{BD} + P_{BE} \leq 1$
235) $P_{AD} + P_{AE} - P_{BC} - P_{BE} + P_{DE} \leq 1$
236) $P_{AD} + P_{AE} - P_{BC} - P_{BE} + P_{CE} \leq 1$
237) $P_{AD} + P_{AE} - P_{BC} - P_{BE} + P_{CD} \leq 1$
238) $P_{AD} + P_{AE} - P_{BC} - P_{CE} + P_{DE} \leq 1$
239) $P_{AC} - P_{AD} + P_{AE} - P_{BD} + P_{CE} \leq 1$
240) $P_{AC} - P_{AD} + P_{AE} - P_{BD} + P_{CD} \leq 1$
241) $P_{AC} - P_{AD} + P_{AE} - P_{BE} + P_{CE} \leq 1$
242) $P_{AC} - P_{AD} + P_{AE} - P_{BE} + P_{CD} \leq 1$
243) $P_{AC} - P_{BC} + P_{CD} - P_{CE} + P_{DE} \leq 1$
244) $P_{AC} - P_{BC} + P_{BD} - P_{BE} + P_{DE} \leq 1$
245) $P_{AC} - P_{BC} + P_{BD} - P_{BE} + P_{CE} \leq 1$
246) $P_{AC} - P_{BC} + P_{BD} - P_{BE} + P_{CD} \leq 1$
247) $P_{AC} - P_{BD} + P_{CD} - P_{CE} + P_{DE} \leq 1$
248) $P_{AC} - P_{BE} + P_{CD} - P_{CE} + P_{DE} \leq 1$
249) $P_{AC} + P_{AE} - P_{BC} - P_{BD} + P_{DE} \leq 1$
250) $P_{AC} + P_{AE} - P_{BC} - P_{BD} + P_{CE} \leq 1$
251) $P_{AC} + P_{AE} - P_{BC} - P_{BD} + P_{CD} \leq 1$
252) $P_{AC} + P_{AE} - P_{BC} - P_{BD} + P_{BE} \leq 1$
253) $P_{AC} + P_{AE} - P_{BC} - P_{BE} + P_{DE} \leq 1$
254) $P_{AC} + P_{AE} - P_{BC} - P_{BE} + P_{CE} \leq 1$
255) $P_{AC} + P_{AE} - P_{BC} - P_{BE} + P_{CD} \leq 1$
256) $P_{AB} - P_{AC} + P_{CD} - P_{CE} + P_{DE} \leq 1$
257) $P_{AB} - P_{AC} + P_{BE} - P_{CE} + P_{DE} \leq 1$
258) $P_{AB} - P_{AC} + P_{BD} - P_{BE} + P_{DE} \leq 1$
259) $P_{AB} - P_{AC} + P_{BD} - P_{BE} + P_{CE} \leq 1$
260) $P_{AB} - P_{AC} + P_{BD} - P_{CE} + P_{DE} \leq 1$
261) $P_{AB} - P_{AC} + P_{BC} - P_{BD} + P_{CD} \leq 1$
262) $P_{AB} - P_{AC} + P_{BC} - P_{BE} + P_{DE} \leq 1$
263) $P_{AB} - P_{AC} + P_{BC} - P_{BE} + P_{CE} \leq 1$
264) $P_{AB} - P_{AC} + P_{BC} - P_{CE} + P_{DE} \leq 1$
265) $P_{AB} - P_{AC} + P_{AE} - P_{BD} + P_{DE} \leq 1$
266) $P_{AB} - P_{AC} + P_{AE} - P_{BD} + P_{CE} \leq 1$
267) $P_{AB} - P_{AC} + P_{AE} - P_{BD} + P_{CD} \leq 1$
268) $P_{AB} - P_{AC} + P_{AE} - P_{BD} + P_{BE} \leq 1$
269) $P_{AB} - P_{AC} + P_{AE} - P_{BE} + P_{DE} \leq 1$
270) $P_{AB} - P_{AC} + P_{AE} - P_{BE} + P_{CE} \leq 1$
271) $P_{AB} - P_{AC} + P_{AE} - P_{BE} + P_{CD} \leq 1$
272) $P_{AB} - P_{AC} + P_{AE} - P_{CE} + P_{DE} \leq 1$
273) $P_{AB} - P_{AC} + P_{AD} - P_{AE} + P_{DE} \leq 1$
274) $P_{AB} - P_{AC} + P_{AD} - P_{AE} + P_{CE} \leq 1$
275) $P_{AB} - P_{AC} + P_{AD} - P_{AE} + P_{CD} \leq 1$
276) $P_{AB} - P_{AC} + P_{AD} - P_{AE} + P_{BE} \leq 1$
277) $P_{AB} - P_{AC} + P_{AD} - P_{BC} + P_{DE} \leq 1$
278) $P_{AB} - P_{AC} + P_{AD} - P_{BC} + P_{CE} \leq 1$
279) $P_{AB} - P_{AC} + P_{AD} - P_{BC} + P_{CD} \leq 1$

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\begin{array}{rl}
280) & P_{AB} - P_{AC} + P_{AD} - P_{BC} + P_{BE} \leq 1 \\
281) & P_{AB} - P_{AC} + P_{AD} - P_{BC} + P_{BD} \leq 1 \\
282) & P_{AB} - P_{AC} + P_{AD} - P_{BD} + P_{DE} \leq 1 \\
283) & P_{AB} - P_{AC} + P_{AD} - P_{BD} + P_{CE} \leq 1 \\
284) & P_{AB} - P_{AC} + P_{AD} - P_{BD} + P_{CD} \leq 1 \\
285) & P_{AB} - P_{AC} + P_{AD} - P_{BD} + P_{BE} \leq 1 \\
286) & P_{AB} - P_{AC} + P_{AD} - P_{BE} + P_{DE} \leq 1 \\
287) & P_{AB} - P_{AC} + P_{AD} - P_{BE} + P_{CE} \leq 1 \\
288) & P_{AB} - P_{AC} + P_{AD} - P_{BE} + P_{CD} \leq 1 \\
289) & P_{AB} - P_{AC} + P_{AD} - P_{CE} + P_{DE} \leq 1 \\
290) & P_{AB} - P_{AC} + P_{AD} + P_{AE} - P_{BC} \leq 1 \\
291) & P_{AB} - P_{AD} + P_{CD} - P_{CE} + P_{DE} \leq 1 \\
292) & P_{AB} - P_{AD} + P_{BD} - P_{BE} + P_{DE} \leq 1 \\
293) & P_{AB} - P_{AD} + P_{BD} - P_{BE} + P_{CE} \leq 1 \\
294) & P_{AB} - P_{AD} + P_{AE} - P_{BD} + P_{DE} \leq 1 \\
295) & P_{AB} - P_{AD} + P_{AE} - P_{BD} + P_{CE} \leq 1 \\
296) & P_{AB} - P_{AD} + P_{AE} - P_{BD} + P_{CD} \leq 1 \\
297) & P_{AB} - P_{AD} + P_{AE} - P_{BD} + P_{BE} \leq 1 \\
298) & P_{AB} - P_{AD} + P_{AE} - P_{BE} + P_{DE} \leq 1 \\
299) & P_{AB} - P_{AD} + P_{AE} - P_{BE} + P_{CE} \leq 1 \\
300) & P_{AB} - P_{AD} + P_{AE} - P_{BE} + P_{CD} \leq 1 \\
301) & P_{AB} - P_{AE} + P_{CD} - P_{CE} + P_{DE} \leq 1 \\
302) & P_{AB} - P_{AE} + P_{BE} - P_{CE} + P_{DE} \leq 1 \\
303) & P_{AB} - P_{BC} + P_{CD} - P_{CE} + P_{DE} \leq 1 \\
304) & P_{AB} - P_{BC} + P_{BE} - P_{CE} + P_{DE} \leq 1 \\
305) & P_{AB} - P_{BC} + P_{BD} - P_{BE} + P_{DE} \leq 1 \\
306) & P_{AB} - P_{BC} + P_{BD} - P_{BE} + P_{CE} \leq 1 \\
307) & P_{AB} - P_{BC} + P_{BD} - P_{BE} + P_{CD} \leq 1 \\
308) & P_{AB} - P_{BC} + P_{BD} - P_{CE} + P_{DE} \leq 1 \\
309) & P_{AB} - P_{BD} + P_{CD} - P_{CE} + P_{DE} \leq 1 \\
310) & P_{AB} - P_{BD} + P_{BE} - P_{CE} + P_{DE} \leq 1 \\
311) & P_{AB} - P_{BE} + P_{CD} - P_{CE} + P_{DE} \leq 1 \\
312) & P_{AB} + P_{AE} - P_{BC} - P_{BD} + P_{DE} \leq 1 \\
313) & P_{AB} + P_{AE} - P_{BC} - P_{BD} + P_{CE} \leq 1 \\
314) & P_{AB} + P_{AE} - P_{BC} - P_{BD} + P_{CD} \leq 1 \\
315) & P_{AB} + P_{AE} - P_{BC} - P_{BD} + P_{BE} \leq 1 \\
316) & P_{AB} + P_{AE} - P_{BC} - P_{BE} + P_{DE} \leq 1 \\
317) & P_{AB} + P_{AE} - P_{BC} - P_{BE} + P_{CE} \leq 1 \\
318) & P_{AB} + P_{AE} - P_{BC} - P_{BE} + P_{CD} \leq 1 \\
319) & P_{AB} + P_{AE} - P_{BC} - P_{CE} + P_{DE} \leq 1 \\
320) & -P_{AB} + 2P_{AE} - P_{BD} - P_{CD} + P_{CE} \leq 1 \\
321) & -P_{AB} + 2P_{AE} - P_{BE} - P_{CD} + P_{CE} \leq 1 \\
322) & -P_{AB} + 2P_{AD} - P_{BD} - P_{CD} + P_{DE} \leq 1 \\
323) & -P_{AB} + 2P_{AD} - P_{BD} - P_{CD} + P_{CE} \leq 1 \\
324) & -P_{AB} + 2P_{AC} - P_{BC} - P_{CD} + P_{CE} \leq 1 \\
325) & -P_{AB} + P_{AE} + P_{BD} - P_{BE} - P_{CD} + P_{CE} \leq 1 \\
326) & -P_{AB} + P_{AE} + P_{BC} - P_{BE} - P_{CD} + P_{CE} \leq 1 \\
327) & -P_{AB} + P_{AD} - P_{BC} + P_{BD} - P_{CD} + P_{DE} \leq 1
\end{array}
$$

328) $-P_{AB} + P_{AD} - P_{BC} + P_{BD} - P_{CD} + P_{CE} \leq 1$

329) $-P_{AB} + P_{AD} + P_{BC} - P_{BD} - P_{BE} + P_{CD} \leq 1$

330) $-P_{AB} + P_{AD} + P_{BC} - P_{BD} - P_{CE} + P_{DE} \leq 1$

331) $-P_{AB} + P_{AD} + P_{AE} - P_{BD} - P_{CD} + P_{DE} \leq 1$

332) $-P_{AB} + P_{AD} + P_{AE} - P_{BE} - P_{CD} + P_{DE} \leq 1$

333) $-P_{AB} + P_{AC} - P_{BC} + P_{BD} - P_{CD} + P_{CE} \leq 1$

334) $-P_{AB} + P_{AC} + P_{AE} - P_{BD} - P_{CD} + P_{CE} \leq 1$

335) $-P_{AB} + P_{AC} + P_{AD} - P_{BD} - P_{CD} + P_{DE} \leq 1$

336) $-P_{AB} + P_{AC} + P_{AD} - P_{BD} - P_{CD} + P_{CE} \leq 1$

337) $-P_{AB} + P_{AC} + P_{AD} - P_{BD} - P_{CE} + P_{DE} \leq 1$

338) $-P_{AC} + P_{AD} + P_{BE} - P_{CD} - P_{CE} + P_{DE} \leq 1$

339) $-P_{AC} + P_{AD} + P_{BC} - P_{CD} - P_{CE} + P_{DE} \leq 1$

340) $P_{AD} - P_{AE} - P_{BE} + P_{CD} + P_{CE} - P_{DE} \leq 1$

341) $P_{AC} - P_{AD} - P_{AE} + P_{CD} - P_{CE} + P_{DE} \leq 1$

342) $P_{AC} - P_{AE} - P_{BE} + P_{CD} + P_{CE} - P_{DE} \leq 1$

343) $P_{AB} - P_{AD} - P_{AE} + P_{BD} - P_{CE} + P_{DE} \leq 1$

344) $P_{AD} - P_{BC} + P_{BD} - P_{BE} + P_{CD} - P_{CE} + P_{DE} \leq 1$

345) $P_{AD} + P_{AE} - P_{BC} - P_{BD} + P_{CD} - P_{CE} + P_{DE} \leq 1$

346) $P_{AD} + P_{AE} - P_{BC} - P_{BD} + P_{BE} - P_{CE} + P_{DE} \leq 1$

347) $P_{AD} + P_{AE} - P_{BC} - P_{BE} + P_{CD} - P_{CE} + P_{DE} \leq 1$

348) $P_{AC} - P_{BC} + P_{BD} - P_{BE} + P_{CD} - P_{CE} + P_{DE} \leq 1$

349) $P_{AC} + P_{AE} - P_{BC} - P_{BD} + P_{CD} - P_{CE} + P_{DE} \leq 1$

350) $P_{AC} + P_{AE} - P_{BC} - P_{BE} + P_{CD} - P_{CE} + P_{DE} \leq 1$

351) $P_{AB} - P_{AC} + P_{BC} - P_{BD} + P_{CD} - P_{CE} + P_{DE} \leq 1$

352) $P_{AB} - P_{AC} + P_{AE} - P_{BD} + P_{CD} - P_{CE} + P_{DE} \leq 1$

353) $P_{AB} - P_{AC} + P_{AE} - P_{BD} + P_{BE} - P_{CE} + P_{DE} \leq 1$

354) $P_{AB} - P_{AC} + P_{AE} - P_{BE} + P_{CD} - P_{CE} + P_{DE} \leq 1$

355) $P_{AB} - P_{AC} + P_{AD} - P_{AE} + P_{CD} - P_{CE} + P_{DE} \leq 1$

356) $P_{AB} - P_{AC} + P_{AD} - P_{AE} + P_{BE} - P_{CE} + P_{DE} \leq 1$

357) $P_{AB} - P_{AC} + P_{AD} - P_{BC} + P_{CD} - P_{CE} + P_{DE} \leq 1$

358) $P_{AB} - P_{AC} + P_{AD} - P_{BC} + P_{BE} - P_{CE} + P_{DE} \leq 1$

359) $P_{AB} - P_{AC} + P_{AD} - P_{BC} + P_{BD} - P_{BE} + P_{DE} \leq 1$

360) $P_{AB} - P_{AC} + P_{AD} - P_{BC} + P_{BD} - P_{BE} + P_{CE} \leq 1$

361) $P_{AB} - P_{AC} + P_{AD} - P_{BC} + P_{BD} - P_{BE} + P_{CD} \leq 1$

362) $P_{AB} - P_{AC} + P_{AD} - P_{BC} + P_{BD} - P_{CE} + P_{DE} \leq 1$

363) $P_{AB} - P_{AC} + P_{AD} - P_{BD} + P_{CD} - P_{CE} + P_{DE} \leq 1$

364) $P_{AB} - P_{AC} + P_{AD} - P_{BD} + P_{BE} - P_{CE} + P_{DE} \leq 1$

365) $P_{AB} - P_{AC} + P_{AD} - P_{BE} + P_{CD} - P_{CE} + P_{DE} \leq 1$

366) $P_{AB} - P_{AC} + P_{AD} + P_{AE} - P_{BC} - P_{BD} + P_{DE} \leq 1$

367) $P_{AB} - P_{AC} + P_{AD} + P_{AE} - P_{BC} - P_{BD} + P_{CE} \leq 1$

368) $P_{AB} - P_{AC} + P_{AD} + P_{AE} - P_{BC} - P_{BD} + P_{CD} \leq 1$

369) $P_{AB} - P_{AC} + P_{AD} + P_{AE} - P_{BC} - P_{BD} + P_{BE} \leq 1$

370) $P_{AB} - P_{AC} + P_{AD} + P_{AE} - P_{BC} - P_{BE} + P_{DE} \leq 1$

371) $P_{AB} - P_{AC} + P_{AD} + P_{AE} - P_{BC} - P_{BE} + P_{CE} \leq 1$

372) $P_{AB} - P_{AC} + P_{AD} + P_{AE} - P_{BC} - P_{BE} + P_{CD} \leq 1$

373) $P_{AB} - P_{AC} + P_{AD} + P_{AE} - P_{BC} - P_{CE} + P_{DE} \leq 1$

374) $P_{AB} - P_{AD} + P_{AE} - P_{BD} + P_{CD} - P_{CE} + P_{DE} \leq 1$

375) $P_{AB} - P_{AD} + P_{AE} - P_{BE} + P_{CD} - P_{CE} + P_{DE} \leq 1$

376) $P_{AB} - P_{BC} + P_{BD} - P_{BE} + P_{CD} - P_{CE} + P_{DE} \le 1$

377) $P_{AB} + P_{AE} - P_{BC} - P_{BD} + P_{CD} - P_{CE} + P_{DE} \le 1$

378) $P_{AB} + P_{AE} - P_{BC} - P_{BD} + P_{BE} - P_{CE} + P_{DE} \le 1$

379) $P_{AB} + P_{AE} - P_{BC} - P_{BE} + P_{CD} - P_{CE} + P_{DE} \le 1$

380) $-P_{AB} + P_{AD} + 2P_{AE} - P_{BC} - P_{BD} - P_{CD} + P_{DE} \le 1$

381) $-P_{AB} + P_{AD} + 2P_{AE} - P_{BC} - P_{BE} - P_{CD} + P_{DE} \le 1$

382) $-P_{AB} + 2P_{AD} + P_{AE} - P_{BC} - P_{BE} - P_{CD} + P_{DE} \le 1$

383) $-P_{AB} + 2P_{AD} + P_{AE} - P_{BC} - P_{BE} - P_{CD} + P_{CE} \le 1$

384) $-P_{AB} + 2P_{AC} + P_{AE} - P_{BC} - P_{BD} - P_{CD} + P_{CE} \le 1$

385) $-P_{AB} + 2P_{AC} + P_{AE} - P_{BC} - P_{BE} - P_{CD} + P_{CE} \le 1$

386) $-P_{AC} + P_{AD} - P_{BC} + 2P_{BD} - P_{CD} - P_{CE} + P_{DE} \le 1$

387) $P_{AB} - P_{AC} - P_{AE} + P_{BC} + P_{BE} - P_{CD} - P_{DE} \le 1$

388) $-P_{AB} + P_{AD} + P_{BC} - P_{BD} - P_{BE} + P_{CD} - P_{CE} + P_{DE} \le 1$

389) $-P_{AB} + P_{AD} + P_{AE} - P_{BC} + P_{BD} - P_{BE} - P_{CD} + P_{DE} \le 1$

390) $-P_{AB} + P_{AC} + P_{AD} + P_{AE} - P_{BC} - P_{BE} - P_{CD} + P_{DE} \le 1$

391) $-P_{AC} + P_{AD} - P_{BC} + P_{BD} + P_{BE} - P_{CD} - P_{CE} + P_{DE} \le 1$

392) $P_{AD} - P_{AE} - P_{BC} + P_{BD} - P_{BE} + P_{CD} + P_{CE} - P_{DE} \le 1$

393) $P_{AC} - P_{AE} - P_{BC} + P_{BD} - P_{BE} + P_{CD} + P_{CE} - P_{DE} \le 1$

394) $P_{AB} - P_{AC} - P_{AD} + P_{AE} + P_{BC} - P_{BE} - P_{CD} + P_{DE} \le 1$

395) $P_{AB} - P_{AC} + P_{AD} - P_{BC} + P_{BD} - P_{BE} + P_{CD} - P_{CE} + P_{DE} \le 1$

396) $P_{AB} - P_{AC} + P_{AD} + P_{AE} - P_{BC} - P_{BD} + P_{CD} - P_{CE} + P_{DE} \le 1$

397) $P_{AB} - P_{AC} + P_{AD} + P_{AE} - P_{BC} - P_{BD} + P_{BE} - P_{CE} + P_{DE} \le 1$

398) $P_{AB} - P_{AC} + P_{AD} + P_{AE} - P_{BC} - P_{BE} + P_{CD} - P_{CE} + P_{DE} \le 1$

399) $P_{AB} - P_{AC} - P_{AE} - P_{BC} + 2P_{BD} + P_{BE} - P_{CD} - P_{DE} \le 1$

400) $-P_{AC} + P_{AD} + P_{BC} - 2P_{CE} + P_{DE} \le 1$

401) $-P_{AB} + 2P_{AD} - 2P_{BC} + P_{BD} - P_{CD} + P_{DE} \le 1$

402) $-P_{AB} + 2P_{AD} - 2P_{BC} + P_{BD} - P_{CD} + P_{CE} \le 1$

403) $-P_{AB} + 2P_{AC} - 2P_{BC} + P_{BD} - P_{CD} + P_{CE} \le 1$

404) $-P_{AC} + P_{AD} - P_{BC} + 2P_{BE} - 2P_{CE} + P_{DE} \le 1$

405) $-P_{AC} + P_{AD} - P_{BC} + 2P_{BD} - 2P_{CE} + P_{DE} \le 1$

406) $-P_{AC} + P_{AD} - P_{BD} + 2P_{BE} - 2P_{CE} + P_{DE} \le 1$

407) $P_{AC} - P_{AD} - P_{BC} + 2P_{CD} - 2P_{CE} + P_{DE} \le 1$

408) $P_{AC} - P_{AD} - P_{BD} + 2P_{CD} - 2P_{CE} + P_{DE} \le 1$

409) $-P_{AB} + P_{AC} + P_{AD} - 2P_{BC} + P_{BD} - P_{CD} + P_{DE} \le 1$

410) $-P_{AB} + P_{AC} + P_{AD} - 2P_{BD} + P_{BE} - P_{CE} + P_{DE} \le 1$

411) $-P_{AC} + P_{AD} + P_{BC} - P_{BD} + P_{BE} - 2P_{CE} + P_{DE} \le 1$

412) $-P_{AB} + 2P_{AD} + 2P_{AE} - 2P_{BC} - P_{BD} - P_{CD} + P_{DE} \le 1$

413) $-P_{AB} + 2P_{AD} + 2P_{AE} - 2P_{BC} - P_{BD} - P_{CD} + P_{CE} \le 1$

414) $-P_{AB} + 2P_{AD} + 2P_{AE} - 2P_{BC} - P_{BE} - P_{CD} + P_{DE} \le 1$

415) $-P_{AB} + 2P_{AD} + 2P_{AE} - 2P_{BC} - P_{BE} - P_{CD} + P_{CE} \le 1$

416) $-P_{AB} + 2P_{AC} + 2P_{AE} - 2P_{BC} - P_{BD} - P_{CD} + P_{CE} \le 1$

417) $-P_{AB} + 2P_{AC} + 2P_{AE} - 2P_{BC} - P_{BE} - P_{CD} + P_{CE} \le 1$

418) $-P_{AB} + 2P_{AD} + P_{AE} - 2P_{BC} + P_{BD} - P_{BE} - P_{CD} + P_{DE} \le 1$

419) $-P_{AB} + 2P_{AD} + P_{AE} - 2P_{BC} + P_{BD} - P_{BE} - P_{CD} + P_{CE} \le 1$

420) $-P_{AB} + P_{AC} + P_{AD} + 2P_{AE} - 2P_{BC} - P_{BD} - P_{CD} + P_{DE} \le 1$

421) $-P_{AB} + P_{AC} + P_{AD} + 2P_{AE} - 2P_{BC} - P_{BE} - P_{CD} + P_{DE} \le 1$

422) $-P_{AB} + 2P_{AC} + P_{AE} - 2P_{BC} + P_{BD} - P_{BE} - P_{CD} + P_{CE} \le 1$

423) $-2P_{AB} + P_{AD} + P_{AE} + P_{BC} - P_{BD} - P_{BE} - P_{CD} + P_{DE} \le 1$

$$
\begin{aligned}
424)\ &- P_{AB} - P_{AC} + P_{AD} + P_{AE} + P_{BC} - P_{BE} - 2P_{CD} + P_{DE} \le 1\\
425)\ &P_{AB} - 2P_{AC} + P_{AD} - P_{AE} + P_{BC} + P_{BE} - P_{CD} - P_{DE} \le 1\\
426)\ &P_{AB} - P_{AC} - 2P_{AD} + P_{AE} + P_{BC} + P_{BE} - P_{CD} - P_{DE} \le 1\\
427)\ &P_{AB} - P_{AC} - P_{AE} + P_{BC} + P_{BE} - P_{CD} - 2P_{CE} + P_{DE} \le 1\\
428)\ &- P_{AB} + P_{AC} + P_{AD} + P_{AE} - 2P_{BC} + P_{BD} - P_{BE} - P_{CD} + P_{DE} \le 1\\
429)\ &- P_{AB} - P_{AC} + P_{AD} + P_{AE} - P_{BC} + 2P_{BD} - P_{BE} - 2P_{CD} + P_{DE} \le 1\\
430)\ &P_{AB} - 2P_{AC} + P_{AD} - P_{AE} - P_{BC} + 2P_{BD} + P_{BE} - P_{CD} - P_{DE} \le 1\\
431)\ &P_{AB} - P_{AC} - P_{AE} - P_{BC} + 2P_{BD} + P_{BE} - P_{CD} - 2P_{CE} + P_{DE} \le 1\\
432)\ &- 2P_{AC} + P_{AD} + 2P_{BE} - P_{CD} - 2P_{CE} + P_{DE} \le 1\\
433)\ &- 2P_{AC} + P_{AD} + P_{BC} + P_{BE} - P_{CD} - 2P_{CE} + P_{DE} \le 1\\
434)\ &P_{AC} - P_{AD} + 2P_{AE} - P_{BC} - 2P_{BE} + 2P_{CD} - 2P_{CE} + P_{DE} \le 1\\
435)\ &- 2P_{AC} + P_{AD} - P_{BC} + P_{BD} + 2P_{BE} - P_{CD} - 2P_{CE} + P_{DE} \le 1\\
436)\ &- 2P_{AC} + P_{AD} - P_{BC} + 2P_{BD} + P_{BE} - P_{CD} - 2P_{CE} + P_{DE} \le 1\\
437)\ &P_{AB} - P_{AC} - P_{AD} + P_{AE} + P_{BC} - 2P_{BD} + P_{BE} + P_{CD} - 2P_{CE} + P_{DE} \le 1\\
438)\ &P_{AB} - 3P_{AC} + 2P_{AD} - P_{AE} + P_{BC} + P_{BE} - P_{CD} - P_{CE} \le 1\\
439)\ &P_{AB} - 3P_{AC} + 2P_{AD} - P_{AE} - P_{BC} + 2P_{BD} + P_{BE} - P_{CD} - P_{CE} \le 1\\
440)\ &P_{AB} - 3P_{AC} + 2P_{AD} - P_{AE} + P_{BC} + P_{BE} - P_{CD} - 2P_{CE} + P_{DE} \le 1\\
441)\ &P_{AB} - 3P_{AC} + 2P_{AD} - P_{AE} - P_{BC} + 2P_{BD} + P_{BE} - P_{CD} - 2P_{CE} + P_{DE} \le 1\\
442)\ &P_{AD} - P_{AE} + P_{BE} - P_{CE} + 2P_{DE} \le 2\\
443)\ &P_{AD} - P_{AE} + P_{BD} - P_{CE} + 2P_{DE} \le 2\\
444)\ &P_{AD} - P_{AE} + P_{BC} - P_{CE} + 2P_{DE} \le 2\\
445)\ &P_{AD} - P_{AE} + P_{BD} - P_{BE} + P_{CD} + P_{CE} \le 2\\
446)\ &P_{AD} - P_{AE} + P_{BC} - P_{BE} + P_{CD} + P_{CE} \le 2\\
447)\ &P_{AC} - P_{AD} + P_{BC} - P_{BD} + P_{BE} + P_{CD} \le 2\\
448)\ &P_{AC} - P_{AE} + P_{BD} - P_{BE} + P_{CD} + P_{CE} \le 2\\
449)\ &P_{AC} - P_{AE} + P_{BC} - P_{BE} + P_{CD} + P_{CE} \le 2\\
450)\ &P_{AB} + P_{AC} - P_{AD} - P_{AE} + P_{BD} + P_{CD} \le 2\\
451)\ &P_{AD} - P_{AE} + P_{BD} - P_{BE} + P_{CD} - P_{CE} + 2P_{DE} \le 2\\
452)\ &P_{AD} - P_{AE} + P_{BC} - P_{BE} + P_{CD} - P_{CE} + 2P_{DE} \le 2\\
453)\ &P_{AC} - P_{AE} + P_{BD} - P_{BE} + P_{CD} - P_{CE} + 2P_{DE} \le 2\\
454)\ &P_{AC} - P_{AE} + P_{BC} - P_{BE} + P_{CD} - P_{CE} + 2P_{DE} \le 2\\
455)\ &P_{AB} + P_{AC} - P_{AD} - P_{AE} + P_{BD} + P_{CD} - P_{CE} + P_{DE} \le 2\\
456)\ &- P_{AB} + 2P_{AD} + P_{BC} - P_{BD} - P_{CD} - P_{CE} + 2P_{DE} \le 2\\
457)\ &- P_{AB} + P_{AD} - P_{AE} + 2P_{BC} - P_{BD} - P_{BE} + P_{CD} + P_{CE} \le 2\\
458)\ &- P_{AB} + P_{AD} - P_{AE} + 2P_{BC} - P_{BD} - P_{BE} + P_{CD} - P_{CE} + 2P_{DE} \le 2\\
459)\ &P_{AD} + P_{BC} - P_{BE} + P_{CD} - 2P_{CE} + 2P_{DE} \le 2\\
460)\ &P_{AB} - P_{AE} + P_{BC} + P_{CD} - 2P_{CE} + 2P_{DE} \le 2\\
461)\ &P_{AC} - P_{AD} + P_{AE} + P_{BC} - 2P_{BD} + P_{BE} + P_{CD} \le 2\\
462)\ &- P_{AC} + P_{AD} - P_{AE} + 2P_{BD} - 2P_{CE} + 2P_{DE} \le 2\\
463)\ &- P_{AC} + P_{AD} - P_{AE} + 2P_{BC} - 2P_{CE} + 2P_{DE} \le 2\\
464)\ &P_{AD} - P_{BC} + 2P_{BD} - P_{BE} + P_{CD} - 2P_{CE} + 2P_{DE} \le 2\\
465)\ &P_{AB} - P_{AC} + P_{AD} - P_{AE} + 2P_{BE} - 2P_{CE} + 2P_{DE} \le 2\\
466)\ &P_{AB} + P_{AC} - P_{AD} - P_{AE} + 2P_{CD} - 2P_{CE} + 2P_{DE} \le 2\\
467)\ &2P_{AB} - P_{AD} - P_{AE} + P_{BD} + P_{CD} - 2P_{CE} + 2P_{DE} \le 2\\
468)\ &2P_{AB} - P_{AD} + P_{BD} - P_{BE} + P_{CD} - 2P_{CE} + 2P_{DE} \le 2\\
469)\ &P_{AB} - P_{AC} + P_{AD} - P_{AE} + P_{BD} + P_{BE} - 2P_{CE} + 2P_{DE} \le 2\\
470)\ &P_{AB} - P_{AC} + P_{AD} - P_{AE} + P_{BC} + P_{BE} - 2P_{CE} + 2P_{DE} \le 2\\
471)\ &2P_{AB} - P_{AD} - P_{BC} + 2P_{BD} - P_{BE} + P_{CD} - 2P_{CE} + 2P_{DE} \le 2
\end{aligned}
$$

$$
\begin{array}{lrrrrrrrrrrrrrrr}
472) & - & P_{AB} & & + & P_{AD} & & + 2P_{BC} & - & P_{BD} & - & P_{BE} & + & P_{CD} - 2P_{CE} + 2P_{DE} & \leq 2 \\
473) & & 2P_{AB} & - & P_{AC} & - & P_{AD} & & + & P_{BC} & - & P_{BD} & + & P_{BE} & + & P_{CD} - 2P_{CE} + 2P_{DE} & \leq 2 \\
474) & & P_{AB} & + & P_{AC} & - & P_{AD} & - 2P_{AE} & & + & P_{BD} & & + & P_{CD} - 2P_{CE} + 2P_{DE} & \leq 2 \\
475) & - & 2P_{AB} & & + 2P_{AD} & + & P_{AE} & + & P_{BC} & - & P_{BD} & - & P_{BE} & - 2P_{CD} & & + 2P_{DE} & \leq 2 \\
476) & & & P_{AC} & - & P_{AD} & - 2P_{AE} & + & P_{BC} & - & P_{BD} & + & P_{BE} & + & P_{CD} - 2P_{CE} + 2P_{DE} & \leq 2 \\
477) & & 2P_{AB} & - & P_{AC} & - & P_{AD} & + & P_{AE} & + & P_{BC} - 2P_{BD} & + & P_{BE} & + & P_{CD} - 2P_{CE} + 2P_{DE} & \leq 2 \\
478) & & & & P_{AD} & - & P_{AE} & & + 2P_{BD} & - & P_{BE} & + & P_{CD} - 2P_{CE} + 3P_{DE} & & & \leq 3 \\
479) & & & & P_{AD} & - & P_{AE} & + 2P_{BC} & & - & P_{BE} & + & P_{CD} - 2P_{CE} + 3P_{DE} & & & \leq 3 \\
480) & & P_{AB} & + 2P_{AC} & - & P_{AD} & - 2P_{AE} & & + & P_{BD} & - & P_{BE} & + 2P_{CD} & + & P_{CE} & & \leq 3 \\
481) & - & P_{AB} & & + & P_{AD} & - & P_{AE} + 3P_{BC} & - & P_{BD} & - & P_{BE} & + & P_{CD} - 2P_{CE} + 3P_{DE} & & & \leq 3 \\
482) & & P_{AB} & + 2P_{AC} & - & P_{AD} & - 2P_{AE} & & + & P_{BD} & - & P_{BE} & + 2P_{CD} & - 2P_{CE} & + 3P_{DE} & & \leq 3 \\
483) & & P_{AB} & - & P_{AC} & + & P_{AD} & - & P_{AE} & & + 2P_{BD} & & + & P_{CD} - 3P_{CE} + 3P_{DE} & & & \leq 3 \\
484) & & P_{AB} & - & P_{AC} & + & P_{AD} & - & P_{AE} + 2P_{BC} & & & & + & P_{CD} - 3P_{CE} + 3P_{DE} & & & \leq 3 \\
485) & & 2P_{AB} & + & P_{AC} & - & P_{AD} & - 2P_{AE} & & + & P_{BD} & & + 2P_{CD} & - 3P_{CE} & + 3P_{DE} & & \leq 3 \\
486) & & P_{AB} & - 3P_{AC} & + 2P_{AD} & - & P_{AE} & + 3P_{BC} & & + & P_{BE} & - & P_{CD} - 4P_{CE} & + 3P_{DE} & & & \leq 3 \\
487) & & P_{AB} & - 3P_{AC} & + 2P_{AD} & - & P_{AE} & - & P_{BC} + 4P_{BD} & + & P_{BE} & - & P_{CD} - 4P_{CE} & + 3P_{DE} & & & \leq 3
\end{array}
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References

Birnbaum, M. (2011). Testing mixture models of transitive preferences: Comments on Regenwetter, Dana, and Davis-Stober (2011). *Psychological Review*.

Birnbaum, M. (2012). A statistical test of independence in choice data with small samples. *Judgment and Decision Making*, 7:97–109.

Cha, Y.-C., Choi, M., Guo, Y., Regenwetter, M., and Zwilling, C. (2013). Reply: Birnbaum's (2012) statistical tests of independence have unknown Type-i error rates and do not replicate within participant. *Judgment and Decision Making*, 8(1):55–73.

Davis-Stober, C. and Brown, N. (2011). A shift in strategy or "error"? strategy classification over multiple stochastic specifications. *Judgment and Decision Making*, 6:800–813.

Klugkist, I. and Hoijtink, H. (2007). The bayes factor for inequality and about equality constrained models. *Computational Statistics & Data Analysi*, 51:6367–6379.

Myung, J., Karabatsos, G., and Iverson, G. (2005). A Bayesian approach to testing decision making axioms. *Journal of Mathematical Psychology*, pages 205—225.

Regenwetter, M., Dana, J., and Davis-Stober, C. P. (2010). Testing transitivity of preferences on two-alternative forced choice data. *Frontiers in Quantitative Psychology and Measurement*.

Regenwetter, M., Dana, J., and Davis-Stober, C. P. (2011a). Transitivity of preferences. *Psychological Review*, 118:42–56.

Regenwetter, M., Dana, J., Davis-Stober, C. P., and Guo, Y. (2011b). Parsimonious testing of transitive or intransitive preferences: Reply to Birnbaum (2011). *Psychological Review*.

Regenwetter, M. and Davis-Stober, C. P. (2012). Choice variability versus structural inconsistency of preferences. *Psychological Review*, 119:408–416.

Smith, B. and Batchelder, W. (2008). Assessing individual differences in categorical data. *Psychonomic Bulletin and Review*, 15:713–731.