```
(* 3 compartmets *)

In[39]:= Ncomp = 3; Nproc = 10;

(* In this example we ave the following processes: Q1 is diff of SCs,
Q2 prol of SC, Q3 is death of TAs, Q4 is asym div of SCs,
Q5 is de-diff of TA, Q6 is death of SCs ; Q7 is diff of TA;
Q8 is de-diff of DC ; Q9 is death of DCs; Q10 is asym diff of TAc *)
R[1] = {-1, 2, 0}; R[2] = {1, 0, 0}; R[3] = {0, -1, 0}; R[4] = {0, 1, 0};
R[5] = {1, -1, 0}; R[6] = {-1, 0, 0};
R[7] = {0, -1, 2}; R[8] = {0, 1, -1}; R[9] = {0, 0, -1}; R[10] = {0, 0, 1};

In[42]:= QQ =.; Do[Do[Q[i, j] =.; QQ[i] =., {i, 1, Nproc}], {j, 1, Ncomp}]

In[43]:= (* See which subsets processes can lead to a nontrivial equilibrium *)

In[44]:= Do[ee[i] = Sum[QQ[k] * R[k][[i]], {k, 1, Nproc}] == 0;
  aa[i] = Sum[QQ[k] * R[k][[i]], {k, 1, Nproc}], {i, 1, Ncomp}];
EQ = Table[ee[i], {i, 1, Ncomp}]

Out[44]= {-QQ[1] + QQ[2] + QQ[5] - QQ[6] == 0,
  2 QQ[1] - QQ[3] + QQ[4] - QQ[5] - QQ[7] + QQ[8] == 0, 2 QQ[7] - QQ[8] - QQ[9] + QQ[10] == 0}

(* Study stability *)

In[47]:= Do[Do[ff[i, j] = Sum[Q[k, j] * R[k][[i]], {k, 1, Nproc}], {i, 1, Ncomp}], {j, 1, Ncomp}]

In[48]:= JJ = Table[ff[i, j], {i, 1, Ncomp}, {j, 1, Ncomp}]

Out[48]= {{-Q[1, 1] + Q[2, 1] + Q[5, 1] - Q[6, 1],
   -Q[1, 2] + Q[2, 2] + Q[5, 2] - Q[6, 2], -Q[1, 3] + Q[2, 3] + Q[5, 3] - Q[6, 3]},
  {2 Q[1, 1] - Q[3, 1] + Q[4, 1] - Q[5, 1] - Q[7, 1] + Q[8, 1],
   2 Q[1, 2] - Q[3, 2] + Q[4, 2] - Q[5, 2] - Q[7, 2] + Q[8, 2],
   2 Q[1, 3] - Q[3, 3] + Q[4, 3] - Q[5, 3] - Q[7, 3] + Q[8, 3]},
  {2 Q[7, 1] - Q[8, 1] - Q[9, 1] + Q[10, 1], 2 Q[7, 2] - Q[8, 2] - Q[9, 2] + Q[10, 2],
   2 Q[7, 3] - Q[8, 3] - Q[9, 3] + Q[10, 3]}}

In[49]:= z =.; var[1] = x; var[2] = y; var[3] = z;

(* Here the program lists all triplets that can be stable. It
 provides the characteristic polynomial, the Jacobian, and eigenvalues,
and the number of simply connected components. It also determines if the
 digraph is a tree. In green it lists the stability conditions. The three
 variants of the stability conditions are all equivalent to each other,
but some of them may have a more compact form than others. *)
```

```
 cases = 0; cnt1 = 0;
ccc = 0; Do[conn[k] = 0, {k, 1, Ncomp}];
Do[Do[Do[Do[Do[Do[
      Do[Do[Q[i, j] = 0, {i, 1, Nproc}], {j, 1, Ncomp}]; Q[i1, j1] =.; Q[i2, j2] =.;
      Q[i3, j3] =.;
      ku4reduce[1] = Q[i1, j1];
      ku4reduce[2] = Q[i2, j2];
      ku4reduce[3] = Q[i3, j3]; EV = Eigenvalues[JJ];
      CP = -CharacteristicPolynomial[JJ, z];
      EP = Product[Eigenvalues[JJ][[k]], {k, 1, Ncomp}];
      qq = 0; If[N[EP] == 0, qq = 1];
      Len = Length[FactorList[CP]] - 1;
      w1 = 1; w2 = 1;
      (* See if the Trace is zero *) If[Sum[JJ[[i, i]], {i, 1, Ncomp}] == 0, {w1 = 0;
        qq = 1 (*Print["Discard! Zero trace!"]*)}];

      (*If there is a term missing from the characteristic polynomial *)
      Do[coe[j] = Coefficient[CP, z, j], {j, 0, Ncomp}];
      If[coe[0] * coe[3] == coe[1] * coe[2], {qq = 1(*;
        Print["Discard because of RH "]*)}];
      If[Product[coe[j], {j, 0, Ncomp}] == 0, {w2 = 0; qq = 1 (*Print[
         "Discard! Term missing from the characteristic polynomial!"]*)}];

      If[Len == 1, {cnt1 = cnt1 + 1;
         (* See if the # of elements is <5 *) If[Sum[Sum[If[NumberQ[JJ[[i, j]]],
               0, 1], {i, 1, Ncomp}], {j, 1, Ncomp}] < 5, {w2 = 0;
           qq = 1(* Print["Discard! Less than 5 elements!"]*)}];
         If[Simplify[coe[0] / coe[1] / coe[2]] == -1, qq = 1]
        }]

       If[qq == 0 && Len == 1, {cases = cases + 1;
         CPx[cases] = CP;
         Print[Style["#", 18, Blue], Style[cases, 18, Blue]];
         Print[ "Triplet: ", "Q", i1,
          var[j1], "   ", "Q", i2, var[j2], "   ", "Q", i3, var[j3]];
         Print["Eigenvalues: ", Eigenvalues[JJ]];
         Print["Char Polyn=", CP];
         Print[Len, "  connected components"];
         Print["Jacobian=", JJ];
         conn[Len] = conn[Len] + 1;
         Print[Style["Stability conditions", 12, Green]];
         Do[Print[Style[k, 12, Green]];
          Print[Reduce[{coe[0] > 0, coe[1] > 0, coe[2] > 0, coe[3] > 0, Simplify[
                coe[1] * coe[2] - coe[3] * coe[0]] > 0}, ku4reduce[k]]], {k, 1, 3}];
         If[JJ[[1, 2]] * JJ[[2, 3]] * JJ[[3, 1]] == 0 && JJ[[2, 1]] * JJ[[1, 3]] *
             JJ[[3, 2]] == 0, Print[Style["The digraph is a tree", 12, Gray]]];
         Print[]
          }], {i1, 1, i2 - 1}], {j1, 1, Ncomp}], {i2, 1, i3 - 1}], {j2, 1, Ncomp}],
  {i3, 1, Nproc}], {j3, 1, Ncomp}]
```

#1

Triplet: Q1z   Q5y   Q7x

Eigenvalues: $\{\text{Root}[-2 Q[1,3] Q[5,2] Q[7,1] + (2 Q[1,3] Q[7,1] + Q[5,2] Q[7,1]) \#1 + Q[5,2] \#1^2 + \#1^3 \&, 1], \text{Root}[-2 Q[1,3] Q[5,2] Q[7,1] + (2 Q[1,3] Q[7,1] + Q[5,2] Q[7,1]) \#1 + Q[5,2] \#1^2 + \#1^3 \&, 2], \text{Root}[-2 Q[1,3] Q[5,2] Q[7,1] + (2 Q[1,3] Q[7,1] + Q[5,2] Q[7,1]) \#1 + Q[5,2] \#1^2 + \#1^3 \&, 3]\}$

Char Polyn=$z^3 + z^2 Q[5,2] + 2 z Q[1,3] Q[7,1] + z Q[5,2] Q[7,1] - 2 Q[1,3] Q[5,2] Q[7,1]$

1 connected components

Jacobian={{0, Q[5, 2], -Q[1, 3]}, {-Q[7, 1], -Q[5, 2], 2 Q[1, 3]}, {2 Q[7, 1], 0, 0}}

Stability conditions

1

$Q[7,1] > 0 \ \&\& \ Q[5,2] > 0 \ \&\& \ -\frac{1}{4} Q[5,2] < Q[1,3] < 0$

2

$Q[7,1] > 0 \ \&\& \ Q[1,3] < 0 \ \&\& \ Q[5,2] > -4 Q[1,3]$

3

$Q[5,2] > 0 \ \&\& \ -\frac{1}{4} Q[5,2] < Q[1,3] < 0 \ \&\& \ Q[7,1] > 0$

#2

Triplet: Q2z Q5y Q7x

Eigenvalues: $\{\text{Root}[-2 Q[2,3] Q[5,2] Q[7,1] + (-2 Q[2,3] Q[7,1] + Q[5,2] Q[7,1]) \#1 + Q[5,2] \#1^2 + \#1^3 \&, 1], \text{Root}[-2 Q[2,3] Q[5,2] Q[7,1] + (-2 Q[2,3] Q[7,1] + Q[5,2] Q[7,1]) \#1 + Q[5,2] \#1^2 + \#1^3 \&, 2], \text{Root}[-2 Q[2,3] Q[5,2] Q[7,1] + (-2 Q[2,3] Q[7,1] + Q[5,2] Q[7,1]) \#1 + Q[5,2] \#1^2 + \#1^3 \&, 3]\}$

Char Polyn=$z^3 + z^2 Q[5,2] - 2 z Q[2,3] Q[7,1] + z Q[5,2] Q[7,1] - 2 Q[2,3] Q[5,2] Q[7,1]$

1 connected components

Jacobian={{0, Q[5, 2], Q[2, 3]}, {-Q[7, 1], -Q[5, 2], 0}, {2 Q[7, 1], 0, 0}}

Stability conditions

1

$Q[7,1] > 0 \ \&\& \ Q[5,2] > 0 \ \&\& \ Q[2,3] < 0$

2

$Q[7,1] > 0 \ \&\& \ Q[2,3] < 0 \ \&\& \ Q[5,2] > 0$

3

$Q[5,2] > 0 \ \&\& \ Q[2,3] < 0 \ \&\& \ Q[7,1] > 0$

The digraphs is a tree

#3

Triplet: Q3z Q5y Q7x

Eigenvalues: $\{\text{Root}[2\,Q[3,3]\,Q[5,2]\,Q[7,1] + Q[5,2]\,Q[7,1]\,\#1 + Q[5,2]\,\#1^2 + \#1^3\,\&, 1],$
$\text{Root}[2\,Q[3,3]\,Q[5,2]\,Q[7,1] + Q[5,2]\,Q[7,1]\,\#1 + Q[5,2]\,\#1^2 + \#1^3\,\&, 2],$
$\text{Root}[2\,Q[3,3]\,Q[5,2]\,Q[7,1] + Q[5,2]\,Q[7,1]\,\#1 + Q[5,2]\,\#1^2 + \#1^3\,\&, 3]\}$

Char Polyn=$z^3 + z^2\,Q[5,2] + z\,Q[5,2]\,Q[7,1] + 2\,Q[3,3]\,Q[5,2]\,Q[7,1]$

1 connected components

Jacobian=$\{\{0, Q[5,2], 0\}, \{-Q[7,1], -Q[5,2], -Q[3,3]\}, \{2\,Q[7,1], 0, 0\}\}$

Stability conditions

1

$Q[7,1] > 0\,\&\&\,Q[5,2] > 0\,\&\&\,0 < Q[3,3] < \frac{1}{2}Q[5,2]$

2

$Q[7,1] > 0\,\&\&\,Q[3,3] > 0\,\&\&\,Q[5,2] > 2\,Q[3,3]$

3

$Q[5,2] > 0\,\&\&\,0 < Q[3,3] < \frac{1}{2}Q[5,2]\,\&\&\,Q[7,1] > 0$

#4

Triplet: Q4z Q5y Q7x

Eigenvalues: $\{\text{Root}[-2\,Q[4,3]\,Q[5,2]\,Q[7,1] + Q[5,2]\,Q[7,1]\,\#1 + Q[5,2]\,\#1^2 + \#1^3\,\&, 1],$
$\text{Root}[-2\,Q[4,3]\,Q[5,2]\,Q[7,1] + Q[5,2]\,Q[7,1]\,\#1 + Q[5,2]\,\#1^2 + \#1^3\,\&, 2],$
$\text{Root}[-2\,Q[4,3]\,Q[5,2]\,Q[7,1] + Q[5,2]\,Q[7,1]\,\#1 + Q[5,2]\,\#1^2 + \#1^3\,\&, 3]\}$

Char Polyn=$z^3 + z^2\,Q[5,2] + z\,Q[5,2]\,Q[7,1] - 2\,Q[4,3]\,Q[5,2]\,Q[7,1]$

1 connected components

Jacobian=$\{\{0, Q[5,2], 0\}, \{-Q[7,1], -Q[5,2], Q[4,3]\}, \{2\,Q[7,1], 0, 0\}\}$

Stability conditions

1

$Q[7,1] > 0\,\&\&\,Q[5,2] > 0\,\&\&\,-\frac{1}{2}Q[5,2] < Q[4,3] < 0$

2

$Q[7,1] > 0\,\&\&\,Q[4,3] < 0\,\&\&\,Q[5,2] > -2\,Q[4,3]$

3

$Q[5,2] > 0\,\&\&\,-\frac{1}{2}Q[5,2] < Q[4,3] < 0\,\&\&\,Q[7,1] > 0$

#5

Triplet: Q1y Q2z Q7x

Eigenvalues: {Root[4 Q[1, 2] Q[2, 3] Q[7, 1] + (-Q[1, 2] Q[7, 1] - 2 Q[2, 3] Q[7, 1]) ♯1 - 2 Q[1, 2] $♯1^2$ + $♯1^3$ &, 1], Root[4 Q[1, 2] Q[2, 3] Q[7, 1] + (-Q[1, 2] Q[7, 1] - 2 Q[2, 3] Q[7, 1]) ♯1 - 2 Q[1, 2] $♯1^2$ + $♯1^3$ &, 2], Root[4 Q[1, 2] Q[2, 3] Q[7, 1] + (-Q[1, 2] Q[7, 1] - 2 Q[2, 3] Q[7, 1]) ♯1 - 2 Q[1, 2] $♯1^2$ + $♯1^3$ &, 3]}

Char Polyn=z^3 - 2 z^2 Q[1, 2] - z Q[1, 2] Q[7, 1] - 2 z Q[2, 3] Q[7, 1] + 4 Q[1, 2] Q[2, 3] Q[7, 1]

1 connected components

Jacobian={{0, -Q[1, 2], Q[2, 3]}, {-Q[7, 1], 2 Q[1, 2], 0}, {2 Q[7, 1], 0, 0}}

Stability conditions

1

Q[7, 1] > 0 && Q[2, 3] < 0 && Q[1, 2] < 0

2

Q[7, 1] > 0 && Q[1, 2] < 0 && Q[2, 3] < 0

3

Q[2, 3] < 0 && Q[1, 2] < 0 && Q[7, 1] > 0

The digraphs is a tree

♯6

Triplet: Q1y Q3z Q7x

Eigenvalues: {Root[-2 Q[1, 2] Q[3, 3] Q[7, 1] - Q[1, 2] Q[7, 1] ♯1 - 2 Q[1, 2] $♯1^2$ + $♯1^3$ &, 1], Root[-2 Q[1, 2] Q[3, 3] Q[7, 1] - Q[1, 2] Q[7, 1] ♯1 - 2 Q[1, 2] $♯1^2$ + $♯1^3$ &, 2], Root[-2 Q[1, 2] Q[3, 3] Q[7, 1] - Q[1, 2] Q[7, 1] ♯1 - 2 Q[1, 2] $♯1^2$ + $♯1^3$ &, 3]}

Char Polyn=z^3 - 2 z^2 Q[1, 2] - z Q[1, 2] Q[7, 1] - 2 Q[1, 2] Q[3, 3] Q[7, 1]

1 connected components

Jacobian={{0, -Q[1, 2], 0}, {-Q[7, 1], 2 Q[1, 2], -Q[3, 3]}, {2 Q[7, 1], 0, 0}}

Stability conditions

1

Q[7, 1] > 0 && Q[3, 3] > 0 && Q[1, 2] < -Q[3, 3]

2

Q[7, 1] > 0 && Q[1, 2] < 0 && 0 < Q[3, 3] < -Q[1, 2]

3

Q[3, 3] > 0 && Q[1, 2] < -Q[3, 3] && Q[7, 1] > 0

♯7

Triplet: Q1y Q4z Q7x

Eigenvalues: {Root[2 Q[1, 2] Q[4, 3] Q[7, 1] - Q[1, 2] Q[7, 1] ♯1 - 2 Q[1, 2] $♯1^2$ + $♯1^3$ &, 1], Root[2 Q[1, 2] Q[4, 3] Q[7, 1] - Q[1, 2] Q[7, 1] ♯1 - 2 Q[1, 2] $♯1^2$ + $♯1^3$ &, 2], Root[2 Q[1, 2] Q[4, 3] Q[7, 1] - Q[1, 2] Q[7, 1] ♯1 - 2 Q[1, 2] $♯1^2$ + $♯1^3$ &, 3]}

```
Char Polyn=z^3 - 2 z^2 Q[1, 2] - z Q[1, 2] Q[7, 1] + 2 Q[1, 2] Q[4, 3] Q[7, 1]

1  connected components

Jacobian={{0, -Q[1, 2], 0}, {-Q[7, 1], 2 Q[1, 2], Q[4, 3]}, {2 Q[7, 1], 0, 0}}

Stability conditions

1

Q[7, 1] > 0 && Q[4, 3] < 0 && Q[1, 2] < Q[4, 3]

2

Q[7, 1] > 0 && Q[1, 2] < 0 && Q[1, 2] < Q[4, 3] < 0

3

Q[4, 3] < 0 && Q[1, 2] < Q[4, 3] && Q[7, 1] > 0
```

#8

```
Triplet: Q1y  Q5z  Q7x

Eigenvalues: {Root[
    2 Q[1, 2] Q[5, 3] Q[7, 1] + (-Q[1, 2] Q[7, 1] - 2 Q[5, 3] Q[7, 1]) #1 - 2 Q[1, 2] #1^2 + #1^3 &, 1],
  Root[2 Q[1, 2] Q[5, 3] Q[7, 1] + (-Q[1, 2] Q[7, 1] - 2 Q[5, 3] Q[7, 1]) #1 - 2 Q[1, 2] #1^2 + #1^3 &,
    2], Root[
    2 Q[1, 2] Q[5, 3] Q[7, 1] + (-Q[1, 2] Q[7, 1] - 2 Q[5, 3] Q[7, 1]) #1 - 2 Q[1, 2] #1^2 + #1^3 &, 3]}
Char Polyn=z^3 - 2 z^2 Q[1, 2] - z Q[1, 2] Q[7, 1] - 2 z Q[5, 3] Q[7, 1] + 2 Q[1, 2] Q[5, 3] Q[7, 1]

1  connected components

Jacobian={{0, -Q[1, 2], Q[5, 3]}, {-Q[7, 1], 2 Q[1, 2], -Q[5, 3]}, {2 Q[7, 1], 0, 0}}

Stability conditions

1

(Q[7, 1] < 0 && Q[5, 3] > 0 && -Q[5, 3] < Q[1, 2] < 0) || (Q[7, 1] > 0 && Q[5, 3] < 0 && Q[1, 2] < 0)

2

(Q[7, 1] < 0 && Q[1, 2] < 0 && Q[5, 3] > -Q[1, 2]) || (Q[7, 1] > 0 && Q[1, 2] < 0 && Q[5, 3] < 0)

3

(Q[5, 3] < 0 && Q[1, 2] < 0 && Q[7, 1] > 0) || (Q[5, 3] > 0 && -Q[5, 3] < Q[1, 2] < 0 && Q[7, 1] < 0)
```

#9

```
Triplet: Q1y  Q6z  Q7x

Eigenvalues: {Root[
    -4 Q[1, 2] Q[6, 3] Q[7, 1] + (-Q[1, 2] Q[7, 1] + 2 Q[6, 3] Q[7, 1]) #1 - 2 Q[1, 2] #1^2 + #1^3 &, 1],
  Root[-4 Q[1, 2] Q[6, 3] Q[7, 1] + (-Q[1, 2] Q[7, 1] + 2 Q[6, 3] Q[7, 1]) #1 - 2 Q[1, 2] #1^2 + #1^3 &,
    2], Root[
    -4 Q[1, 2] Q[6, 3] Q[7, 1] + (-Q[1, 2] Q[7, 1] + 2 Q[6, 3] Q[7, 1]) #1 - 2 Q[1, 2] #1^2 + #1^3 &, 3]}
Char Polyn=z^3 - 2 z^2 Q[1, 2] - z Q[1, 2] Q[7, 1] + 2 z Q[6, 3] Q[7, 1] - 4 Q[1, 2] Q[6, 3] Q[7, 1]

1  connected components
```

Jacobian={{0, -Q[1, 2], -Q[6, 3]}, {-Q[7, 1], 2 Q[1, 2], 0}, {2 Q[7, 1], 0, 0}}

Stability conditions

1

Q[7, 1] > 0 && Q[6, 3] > 0 && Q[1, 2] < 0

2

Q[7, 1] > 0 && Q[1, 2] < 0 && Q[6, 3] > 0

3

Q[6, 3] > 0 && Q[1, 2] < 0 && Q[7, 1] > 0

The digraphs is a tree

#10

Triplet: Q5y Q6z Q7x

Eigenvalues:

{Root[2 Q[5, 2] Q[6, 3] Q[7, 1] + (Q[5, 2] Q[7, 1] + 2 Q[6, 3] Q[7, 1]) #1 + Q[5, 2] #1^2 + #1^3 &, 1],
Root[2 Q[5, 2] Q[6, 3] Q[7, 1] + (Q[5, 2] Q[7, 1] + 2 Q[6, 3] Q[7, 1]) #1 + Q[5, 2] #1^2 + #1^3 &, 2],
Root[2 Q[5, 2] Q[6, 3] Q[7, 1] + (Q[5, 2] Q[7, 1] + 2 Q[6, 3] Q[7, 1]) #1 + Q[5, 2] #1^2 + #1^3 &, 3]}

Char Polyn=$z^3 + z^2$ Q[5, 2] + z Q[5, 2] Q[7, 1] + 2 z Q[6, 3] Q[7, 1] + 2 Q[5, 2] Q[6, 3] Q[7, 1]

1 connected components

Jacobian={{0, Q[5, 2], -Q[6, 3]}, {-Q[7, 1], -Q[5, 2], 0}, {2 Q[7, 1], 0, 0}}

Stability conditions

1

Q[7, 1] > 0 && Q[6, 3] > 0 && Q[5, 2] > 0

2

Q[7, 1] > 0 && Q[5, 2] > 0 && Q[6, 3] > 0

3

Q[6, 3] > 0 && Q[5, 2] > 0 && Q[7, 1] > 0

The digraphs is a tree

#11

Triplet: Q1z Q5y Q8x

Eigenvalues:

{Root[Q[1, 3] Q[5, 2] Q[8, 1] + (-Q[1, 3] Q[8, 1] - Q[5, 2] Q[8, 1]) #1 + Q[5, 2] #1^2 + #1^3 &, 1],
Root[Q[1, 3] Q[5, 2] Q[8, 1] + (-Q[1, 3] Q[8, 1] - Q[5, 2] Q[8, 1]) #1 + Q[5, 2] #1^2 + #1^3 &, 2],
Root[Q[1, 3] Q[5, 2] Q[8, 1] + (-Q[1, 3] Q[8, 1] - Q[5, 2] Q[8, 1]) #1 + Q[5, 2] #1^2 + #1^3 &, 3]}

Char Polyn=$z^3 + z^2$ Q[5, 2] - z Q[1, 3] Q[8, 1] - z Q[5, 2] Q[8, 1] + Q[1, 3] Q[5, 2] Q[8, 1]

1 connected components

Jacobian={{0, Q[5, 2], -Q[1, 3]}, {Q[8, 1], -Q[5, 2], 2 Q[1, 3]}, {-Q[8, 1], 0, 0}}

Stability conditions

1

$Q[8, 1] < 0 \&\& Q[5, 2] > 0 \&\& -\frac{1}{2} Q[5, 2] < Q[1, 3] < 0$

2

$Q[8, 1] < 0 \&\& Q[1, 3] < 0 \&\& Q[5, 2] > -2 Q[1, 3]$

3

$Q[5, 2] > 0 \&\& -\frac{1}{2} Q[5, 2] < Q[1, 3] < 0 \&\& Q[8, 1] < 0$

#12

Triplet: Q2z Q5y Q8x

Eigenvalues:
{Root[Q[2, 3] Q[5, 2] Q[8, 1] + (Q[2, 3] Q[8, 1] - Q[5, 2] Q[8, 1]) #1 + Q[5, 2] #1^2 + #1^3 &, 1],
Root[Q[2, 3] Q[5, 2] Q[8, 1] + (Q[2, 3] Q[8, 1] - Q[5, 2] Q[8, 1]) #1 + Q[5, 2] #1^2 + #1^3 &, 2],
Root[Q[2, 3] Q[5, 2] Q[8, 1] + (Q[2, 3] Q[8, 1] - Q[5, 2] Q[8, 1]) #1 + Q[5, 2] #1^2 + #1^3 &, 3]}

Char Polyn= $z^3 + z^2 Q[5, 2] + z Q[2, 3] Q[8, 1] - z Q[5, 2] Q[8, 1] + Q[2, 3] Q[5, 2] Q[8, 1]$

1 connected components

Jacobian={{0, Q[5, 2], Q[2, 3]}, {Q[8, 1], -Q[5, 2], 0}, {-Q[8, 1], 0, 0}}

Stability conditions

1

$Q[8, 1] < 0 \&\& Q[5, 2] > 0 \&\& Q[2, 3] < 0$

2

$Q[8, 1] < 0 \&\& Q[2, 3] < 0 \&\& Q[5, 2] > 0$

3

$Q[5, 2] > 0 \&\& Q[2, 3] < 0 \&\& Q[8, 1] < 0$

The digraphs is a tree

#13

Triplet: Q3z Q5y Q8x

Eigenvalues: {Root[-Q[3, 3] Q[5, 2] Q[8, 1] - Q[5, 2] Q[8, 1] #1 + Q[5, 2] #1^2 + #1^3 &, 1],
Root[-Q[3, 3] Q[5, 2] Q[8, 1] - Q[5, 2] Q[8, 1] #1 + Q[5, 2] #1^2 + #1^3 &, 2],
Root[-Q[3, 3] Q[5, 2] Q[8, 1] - Q[5, 2] Q[8, 1] #1 + Q[5, 2] #1^2 + #1^3 &, 3]}

Char Polyn= $z^3 + z^2 Q[5, 2] - z Q[5, 2] Q[8, 1] - Q[3, 3] Q[5, 2] Q[8, 1]$

1 connected components

Jacobian={{0, Q[5, 2], 0}, {Q[8, 1], -Q[5, 2], -Q[3, 3]}, {-Q[8, 1], 0, 0}}

Stability conditions

1

$Q[8, 1] < 0 \&\& Q[5, 2] > 0 \&\& 0 < Q[3, 3] < Q[5, 2]$

2

```
Q[8, 1] < 0 && Q[3, 3] > 0 && Q[5, 2] > Q[3, 3]
```

3

```
Q[5, 2] > 0 && 0 < Q[3, 3] < Q[5, 2] && Q[8, 1] < 0
```

#14

```
Triplet: Q4z  Q5y  Q8x

Eigenvalues: {Root[Q[4, 3] Q[5, 2] Q[8, 1] - Q[5, 2] Q[8, 1] #1 + Q[5, 2] #1^2 + #1^3 &, 1],
  Root[Q[4, 3] Q[5, 2] Q[8, 1] - Q[5, 2] Q[8, 1] #1 + Q[5, 2] #1^2 + #1^3 &, 2],
  Root[Q[4, 3] Q[5, 2] Q[8, 1] - Q[5, 2] Q[8, 1] #1 + Q[5, 2] #1^2 + #1^3 &, 3]}
```

Char Polyn=$z^3 + z^2$ Q[5, 2] - z Q[5, 2] Q[8, 1] + Q[4, 3] Q[5, 2] Q[8, 1]

1 connected components

```
Jacobian={{0, Q[5, 2], 0}, {Q[8, 1], -Q[5, 2], Q[4, 3]}, {-Q[8, 1], 0, 0}}
```

Stability conditions

1

```
Q[8, 1] < 0 && Q[5, 2] > 0 && -Q[5, 2] < Q[4, 3] < 0
```

2

```
Q[8, 1] < 0 && Q[4, 3] < 0 && Q[5, 2] > -Q[4, 3]
```

3

```
Q[5, 2] > 0 && -Q[5, 2] < Q[4, 3] < 0 && Q[8, 1] < 0
```

#15

```
Triplet: Q1z  Q7y  Q8x

Eigenvalues:
 {Root[Q[1, 3] Q[7, 2] Q[8, 1] + (-4 Q[1, 3] Q[7, 2] - Q[1, 3] Q[8, 1]) #1 + Q[7, 2] #1^2 + #1^3 &, 1],
  Root[Q[1, 3] Q[7, 2] Q[8, 1] + (-4 Q[1, 3] Q[7, 2] - Q[1, 3] Q[8, 1]) #1 + Q[7, 2] #1^2 + #1^3 &, 2],
  Root[Q[1, 3] Q[7, 2] Q[8, 1] + (-4 Q[1, 3] Q[7, 2] - Q[1, 3] Q[8, 1]) #1 + Q[7, 2] #1^2 + #1^3 &, 3]}
```

Char Polyn=$z^3 + z^2$ Q[7, 2] - 4 z Q[1, 3] Q[7, 2] - z Q[1, 3] Q[8, 1] + Q[1, 3] Q[7, 2] Q[8, 1]

1 connected components

```
Jacobian={{0, 0, -Q[1, 3]}, {Q[8, 1], -Q[7, 2], 2 Q[1, 3]}, {-Q[8, 1], 2 Q[7, 2], 0}}
```

Stability conditions

1

Q[8, 1] < 0 && Q[7, 2] > $-\frac{1}{2}$ Q[8, 1] && Q[1, 3] < 0

2

Q[8, 1] < 0 && Q[1, 3] < 0 && Q[7, 2] > $-\frac{1}{2}$ Q[8, 1]

3

```
Q[7, 2] > 0 && Q[1, 3] < 0 && -2 Q[7, 2] < Q[8, 1] < 0
```

♯16

Triplet: Q5z Q7y Q8x

Eigenvalues:
{Root[-Q[5, 3] Q[7, 2] Q[8, 1] + (2 Q[5, 3] Q[7, 2] + Q[5, 3] Q[8, 1]) ♯1 + Q[7, 2] ♯1^2 + ♯1^3 &, 1],
Root[-Q[5, 3] Q[7, 2] Q[8, 1] + (2 Q[5, 3] Q[7, 2] + Q[5, 3] Q[8, 1]) ♯1 + Q[7, 2] ♯1^2 + ♯1^3 &, 2],
Root[-Q[5, 3] Q[7, 2] Q[8, 1] + (2 Q[5, 3] Q[7, 2] + Q[5, 3] Q[8, 1]) ♯1 + Q[7, 2] ♯1^2 + ♯1^3 &, 3]}

Char Polyn=z^3 + z^2 Q[7, 2] + 2 z Q[5, 3] Q[7, 2] + z Q[5, 3] Q[8, 1] - Q[5, 3] Q[7, 2] Q[8, 1]

1 connected components

Jacobian={{0, 0, Q[5, 3]}, {Q[8, 1], -Q[7, 2], -Q[5, 3]}, {-Q[8, 1], 2 Q[7, 2], 0}}

Stability conditions

1

Q[8, 1] < 0 && Q[7, 2] > -Q[8, 1] && Q[5, 3] > 0

2

Q[8, 1] < 0 && Q[5, 3] > 0 && Q[7, 2] > -Q[8, 1]

3

Q[7, 2] > 0 && Q[5, 3] > 0 && -Q[7, 2] < Q[8, 1] < 0

♯17

Triplet: Q1y Q2z Q8x

Eigenvalues: {Root[
-2 Q[1, 2] Q[2, 3] Q[8, 1] + (Q[1, 2] Q[8, 1] + Q[2, 3] Q[8, 1]) ♯1 - 2 Q[1, 2] ♯1^2 + ♯1^3 &, 1],
Root[-2 Q[1, 2] Q[2, 3] Q[8, 1] + (Q[1, 2] Q[8, 1] + Q[2, 3] Q[8, 1]) ♯1 - 2 Q[1, 2] ♯1^2 + ♯1^3 &,
2], Root[
-2 Q[1, 2] Q[2, 3] Q[8, 1] + (Q[1, 2] Q[8, 1] + Q[2, 3] Q[8, 1]) ♯1 - 2 Q[1, 2] ♯1^2 + ♯1^3 &, 3]}

Char Polyn=z^3 - 2 z^2 Q[1, 2] + z Q[1, 2] Q[8, 1] + z Q[2, 3] Q[8, 1] - 2 Q[1, 2] Q[2, 3] Q[8, 1]

1 connected components

Jacobian={{0, -Q[1, 2], Q[2, 3]}, {Q[8, 1], 2 Q[1, 2], 0}, {-Q[8, 1], 0, 0}}

Stability conditions

1

Q[8, 1] < 0 && Q[2, 3] < 0 && Q[1, 2] < 0

2

Q[8, 1] < 0 && Q[1, 2] < 0 && Q[2, 3] < 0

3

Q[2, 3] < 0 && Q[1, 2] < 0 && Q[8, 1] < 0

The digraphs is a tree

♯18

Triplet: Q1y Q3z Q8x

Eigenvalues: {Root[Q[1, 2] Q[3, 3] Q[8, 1] + Q[1, 2] Q[8, 1] #1 - 2 Q[1, 2] #1^2 + #1^3 &, 1],
Root[Q[1, 2] Q[3, 3] Q[8, 1] + Q[1, 2] Q[8, 1] #1 - 2 Q[1, 2] #1^2 + #1^3 &, 2],
Root[Q[1, 2] Q[3, 3] Q[8, 1] + Q[1, 2] Q[8, 1] #1 - 2 Q[1, 2] #1^2 + #1^3 &, 3]}

Char Polyn= $z^3 - 2 z^2 Q[1, 2] + z Q[1, 2] Q[8, 1] + Q[1, 2] Q[3, 3] Q[8, 1]$

1 connected components

Jacobian={{0, -Q[1, 2], 0}, {Q[8, 1], 2 Q[1, 2], -Q[3, 3]}, {-Q[8, 1], 0, 0}}

Stability conditions

1

$Q[8, 1] < 0 \&\& Q[3, 3] > 0 \&\& Q[1, 2] < -\frac{1}{2} Q[3, 3]$

2

$Q[8, 1] < 0 \&\& Q[1, 2] < 0 \&\& 0 < Q[3, 3] < -2 Q[1, 2]$

3

$Q[3, 3] > 0 \&\& Q[1, 2] < -\frac{1}{2} Q[3, 3] \&\& Q[8, 1] < 0$

#19

Triplet: Q1y Q4z Q8x

Eigenvalues: {Root[-Q[1, 2] Q[4, 3] Q[8, 1] + Q[1, 2] Q[8, 1] #1 - 2 Q[1, 2] #1^2 + #1^3 &, 1],
Root[-Q[1, 2] Q[4, 3] Q[8, 1] + Q[1, 2] Q[8, 1] #1 - 2 Q[1, 2] #1^2 + #1^3 &, 2],
Root[-Q[1, 2] Q[4, 3] Q[8, 1] + Q[1, 2] Q[8, 1] #1 - 2 Q[1, 2] #1^2 + #1^3 &, 3]}

Char Polyn= $z^3 - 2 z^2 Q[1, 2] + z Q[1, 2] Q[8, 1] - Q[1, 2] Q[4, 3] Q[8, 1]$

1 connected components

Jacobian={{0, -Q[1, 2], 0}, {Q[8, 1], 2 Q[1, 2], Q[4, 3]}, {-Q[8, 1], 0, 0}}

Stability conditions

1

$Q[8, 1] < 0 \&\& Q[4, 3] < 0 \&\& Q[1, 2] < \frac{1}{2} Q[4, 3]$

2

$Q[8, 1] < 0 \&\& Q[1, 2] < 0 \&\& 2 Q[1, 2] < Q[4, 3] < 0$

3

$Q[4, 3] < 0 \&\& Q[1, 2] < \frac{1}{2} Q[4, 3] \&\& Q[8, 1] < 0$

#20

Triplet: Q1y Q5z Q8x

Eigenvalues:
{Root[-Q[1, 2] Q[5, 3] Q[8, 1] + (Q[1, 2] Q[8, 1] + Q[5, 3] Q[8, 1]) #1 - 2 Q[1, 2] #1^2 + #1^3 &, 1],
Root[-Q[1, 2] Q[5, 3] Q[8, 1] + (Q[1, 2] Q[8, 1] + Q[5, 3] Q[8, 1]) #1 - 2 Q[1, 2] #1^2 + #1^3 &, 2],
Root[-Q[1, 2] Q[5, 3] Q[8, 1] + (Q[1, 2] Q[8, 1] + Q[5, 3] Q[8, 1]) #1 - 2 Q[1, 2] #1^2 + #1^3 &, 3]}

Char Polyn= $z^3 - 2 z^2 Q[1, 2] + z Q[1, 2] Q[8, 1] + z Q[5, 3] Q[8, 1] - Q[1, 2] Q[5, 3] Q[8, 1]$

1 connected components

Jacobian={{0, -Q[1, 2], Q[5, 3]}, {Q[8, 1], 2 Q[1, 2], -Q[5, 3]}, {-Q[8, 1], 0, 0}}

Stability conditions

1

$(Q[8, 1] < 0 \&\& Q[5, 3] < 0 \&\& Q[1, 2] < 0) \| \left(Q[8, 1] > 0 \&\& Q[5, 3] > 0 \&\& -\frac{1}{2} Q[5, 3] < Q[1, 2] < 0\right)$

2

$(Q[8, 1] < 0 \&\& Q[1, 2] < 0 \&\& Q[5, 3] < 0) \| (Q[8, 1] > 0 \&\& Q[1, 2] < 0 \&\& Q[5, 3] > -2 Q[1, 2])$

3

$(Q[5, 3] < 0 \&\& Q[1, 2] < 0 \&\& Q[8, 1] < 0) \| \left(Q[5, 3] > 0 \&\& -\frac{1}{2} Q[5, 3] < Q[1, 2] < 0 \&\& Q[8, 1] > 0\right)$

#21

Triplet: Q1y Q6z Q8x

Eigenvalues:
{Root[2 Q[1, 2] Q[6, 3] Q[8, 1] + (Q[1, 2] Q[8, 1] - Q[6, 3] Q[8, 1]) #1 - 2 Q[1, 2] #1^2 + #1^3 &, 1],
Root[2 Q[1, 2] Q[6, 3] Q[8, 1] + (Q[1, 2] Q[8, 1] - Q[6, 3] Q[8, 1]) #1 - 2 Q[1, 2] #1^2 + #1^3 &, 2],
Root[2 Q[1, 2] Q[6, 3] Q[8, 1] + (Q[1, 2] Q[8, 1] - Q[6, 3] Q[8, 1]) #1 - 2 Q[1, 2] #1^2 + #1^3 &, 3]}

Char Polyn= $z^3 - 2 z^2 Q[1, 2] + z Q[1, 2] Q[8, 1] - z Q[6, 3] Q[8, 1] + 2 Q[1, 2] Q[6, 3] Q[8, 1]$

1 connected components

Jacobian={{0, -Q[1, 2], -Q[6, 3]}, {Q[8, 1], 2 Q[1, 2], 0}, {-Q[8, 1], 0, 0}}

Stability conditions

1

$Q[8, 1] < 0 \&\& Q[6, 3] > 0 \&\& Q[1, 2] < 0$

2

$Q[8, 1] < 0 \&\& Q[1, 2] < 0 \&\& Q[6, 3] > 0$

3

$Q[6, 3] > 0 \&\& Q[1, 2] < 0 \&\& Q[8, 1] < 0$

The digraphs is a tree

#22

Triplet: Q5y Q6z Q8x

Eigenvalues:
{Root[-Q[5, 2] Q[6, 3] Q[8, 1] + (-Q[5, 2] Q[8, 1] - Q[6, 3] Q[8, 1]) #1 + Q[5, 2] #1^2 + #1^3 &, 1],
Root[-Q[5, 2] Q[6, 3] Q[8, 1] + (-Q[5, 2] Q[8, 1] - Q[6, 3] Q[8, 1]) #1 + Q[5, 2] #1^2 + #1^3 &, 2],
Root[-Q[5, 2] Q[6, 3] Q[8, 1] + (-Q[5, 2] Q[8, 1] - Q[6, 3] Q[8, 1]) #1 + Q[5, 2] #1^2 + #1^3 &, 3]}

Char Polyn= $z^3 + z^2 Q[5, 2] - z Q[5, 2] Q[8, 1] - z Q[6, 3] Q[8, 1] - Q[5, 2] Q[6, 3] Q[8, 1]$

1 connected components

Jacobian={{0, Q[5, 2], -Q[6, 3]}, {Q[8, 1], -Q[5, 2], 0}, {-Q[8, 1], 0, 0}}

Stability conditions

1

$Q[8,1] < 0 \,\&\&\, Q[6,3] > 0 \,\&\&\, Q[5,2] > 0$

2

$Q[8,1] < 0 \,\&\&\, Q[5,2] > 0 \,\&\&\, Q[6,3] > 0$

3

$Q[6,3] > 0 \,\&\&\, Q[5,2] > 0 \,\&\&\, Q[8,1] < 0$

The digraphs is a tree

♯23

Triplet: Q1y Q7z Q8x

Eigenvalues:
$$\{\text{Root}[-Q[1,2]\,Q[7,3]\,Q[8,1] + (4\,Q[1,2]\,Q[7,3] + Q[1,2]\,Q[8,1])\,\sharp 1 + (-2\,Q[1,2] - 2\,Q[7,3])\,\sharp 1^2 + \sharp 1^3\,\&,\,1],$$
$$\text{Root}[-Q[1,2]\,Q[7,3]\,Q[8,1] + (4\,Q[1,2]\,Q[7,3] + Q[1,2]\,Q[8,1])\,\sharp 1 + (-2\,Q[1,2] - 2\,Q[7,3])\,\sharp 1^2 + \sharp 1^3\,\&,\,2],$$
$$\text{Root}[-Q[1,2]\,Q[7,3]\,Q[8,1] + (4\,Q[1,2]\,Q[7,3] + Q[1,2]\,Q[8,1])\,\sharp 1 + (-2\,Q[1,2] - 2\,Q[7,3])\,\sharp 1^2 + \sharp 1^3\,\&,\,3]\}$$

Char Polyn=
$$z^3 - 2\,z^2\,Q[1,2] - 2\,z^2\,Q[7,3] + 4\,z\,Q[1,2]\,Q[7,3] + z\,Q[1,2]\,Q[8,1] - Q[1,2]\,Q[7,3]\,Q[8,1]$$

1 connected components

Jacobian={{0, -Q[1, 2], 0}, {Q[8, 1], 2 Q[1, 2], -Q[7, 3]}, {-Q[8, 1], 0, 2 Q[7, 3]}}

Stability conditions

1

$$(Q[8,1] < 0 \,\&\&\, Q[7,3] < 0 \,\&\&\, Q[1,2] < 0)\ ||\ \left(Q[8,1] > 0 \,\&\&\, -\frac{1}{8}Q[8,1] < Q[7,3] < 0 \,\&\&\, 0 < Q[1,2] < \frac{-8\,Q[7,3]^2 - Q[7,3]\,Q[8,1]}{8\,Q[7,3] + 2\,Q[8,1]}\right)$$

2

$$(Q[8,1] < 0 \,\&\&\, Q[1,2] < 0 \,\&\&\, Q[7,3] < 0)\ ||\ \left(Q[8,1] > 0 \,\&\&\, 0 < Q[1,2] < \frac{3}{8}Q[8,1] - \frac{\sqrt{Q[8,1]^2}}{2\sqrt{2}} \,\&\&\, \frac{1}{16}(-8\,Q[1,2] - Q[8,1]) - \frac{1}{16}\sqrt{64\,Q[1,2]^2 - 48\,Q[1,2]\,Q[8,1] + Q[8,1]^2} < Q[7,3] < \frac{1}{16}(-8\,Q[1,2] - Q[8,1]) + \frac{1}{16}\sqrt{64\,Q[1,2]^2 - 48\,Q[1,2]\,Q[8,1] + Q[8,1]^2}\right)$$

3

$$Q[7,3] < 0 \,\&\&\, \left((Q[1,2] < 0 \,\&\&\, Q[8,1] < 0)\ ||\ \left(0 < Q[1,2] < -\frac{1}{2}Q[7,3] \,\&\&\, Q[8,1] > \frac{-8\,Q[1,2]\,Q[7,3] - 8\,Q[7,3]^2}{2\,Q[1,2] + Q[7,3]}\right)\right)$$

♯24

Triplet: Q2y Q7z Q8x

Eigenvalues: {Root[Q[2, 2] Q[7, 3] Q[8, 1] - Q[2, 2] Q[8, 1] ♯1 - 2 Q[7, 3] ♯1^2 + ♯1^3 &, 1],
Root[Q[2, 2] Q[7, 3] Q[8, 1] - Q[2, 2] Q[8, 1] ♯1 - 2 Q[7, 3] ♯1^2 + ♯1^3 &, 2],
Root[Q[2, 2] Q[7, 3] Q[8, 1] - Q[2, 2] Q[8, 1] ♯1 - 2 Q[7, 3] ♯1^2 + ♯1^3 &, 3]}

Char Polyn=$z^3 - 2 z^2 Q[7, 3] - z Q[2, 2] Q[8, 1] + Q[2, 2] Q[7, 3] Q[8, 1]$

1 connected components

Jacobian={{0, Q[2, 2], 0}, {Q[8, 1], 0, -Q[7, 3]}, {-Q[8, 1], 0, 2 Q[7, 3]}}

Stability conditions

1

(Q[8, 1] < 0 && Q[7, 3] < 0 && Q[2, 2] > 0) || (Q[8, 1] > 0 && Q[7, 3] < 0 && Q[2, 2] < 0)

2

(Q[8, 1] < 0 && Q[2, 2] > 0 && Q[7, 3] < 0) || (Q[8, 1] > 0 && Q[2, 2] < 0 && Q[7, 3] < 0)

3

Q[7, 3] < 0 && ((Q[2, 2] < 0 && Q[8, 1] > 0) || (Q[2, 2] > 0 && Q[8, 1] < 0))

♯25

Triplet: Q5y Q7z Q8x

Eigenvalues: {Root[Q[5, 2] Q[7, 3] Q[8, 1] +
(-2 Q[5, 2] Q[7, 3] - Q[5, 2] Q[8, 1]) ♯1 + (Q[5, 2] - 2 Q[7, 3]) ♯1^2 + ♯1^3 &, 1],
Root[Q[5, 2] Q[7, 3] Q[8, 1] + (-2 Q[5, 2] Q[7, 3] - Q[5, 2] Q[8, 1]) ♯1 +
(Q[5, 2] - 2 Q[7, 3]) ♯1^2 + ♯1^3 &, 2], Root[Q[5, 2] Q[7, 3] Q[8, 1] +
(-2 Q[5, 2] Q[7, 3] - Q[5, 2] Q[8, 1]) ♯1 + (Q[5, 2] - 2 Q[7, 3]) ♯1^2 + ♯1^3 &, 3]}

Char Polyn=
$z^3 + z^2 Q[5, 2] - 2 z^2 Q[7, 3] - 2 z Q[5, 2] Q[7, 3] - z Q[5, 2] Q[8, 1] + Q[5, 2] Q[7, 3] Q[8, 1]$

1 connected components

Jacobian={{0, Q[5, 2], 0}, {Q[8, 1], -Q[5, 2], -Q[7, 3]}, {-Q[8, 1], 0, 2 Q[7, 3]}}

Stability conditions

1

$$(Q[8, 1] < 0 \;\&\&\; Q[7, 3] < 0 \;\&\&\; Q[5, 2] > 0) \;||\; \left(Q[8, 1] > 0 \;\&\&\; -\frac{1}{4} Q[8, 1] < Q[7, 3] < 0 \;\&\&\; \frac{4 Q[7, 3]^2 + Q[7, 3] Q[8, 1]}{2 Q[7, 3] + Q[8, 1]} < Q[5, 2] < 0\right)$$

2

$$(Q[8, 1] < 0 \;\&\&\; Q[5, 2] > 0 \;\&\&\; Q[7, 3] < 0) \;||\; \left(Q[8, 1] > 0 \;\&\&\; -\frac{3}{2} Q[8, 1] + \sqrt{2} \sqrt{Q[8, 1]^2} < Q[5, 2] < 0 \;\&\&\; \frac{1}{8} (2 Q[5, 2] - Q[8, 1]) - \frac{1}{8} \sqrt{4 Q[5, 2]^2 + 12 Q[5, 2] Q[8, 1] + Q[8, 1]^2} < Q[7, 3] < \frac{1}{8} (2 Q[5, 2] - Q[8, 1]) + \frac{1}{8} \sqrt{4 Q[5, 2]^2 + 12 Q[5, 2] Q[8, 1] + Q[8, 1]^2}\right)$$

3

$Q[7,3] < 0 \,\&\&\, \left(\left(Q[7,3] < Q[5,2] < 0 \,\&\&\, Q[8,1] > \frac{-2\,Q[5,2]\,Q[7,3] + 4\,Q[7,3]^2}{Q[5,2] - Q[7,3]}\right) \,||\, (Q[5,2] > 0 \,\&\&\, Q[8,1] < 0)\right)$

♯26

Triplet: Q6y Q7z Q8x

Eigenvalues: $\{\text{Root}[-Q[6,2]\,Q[7,3]\,Q[8,1] + Q[6,2]\,Q[8,1]\,\sharp 1 - 2\,Q[7,3]\,\sharp 1^2 + \sharp 1^3\,\&, 1],$
$\text{Root}[-Q[6,2]\,Q[7,3]\,Q[8,1] + Q[6,2]\,Q[8,1]\,\sharp 1 - 2\,Q[7,3]\,\sharp 1^2 + \sharp 1^3\,\&, 2],$
$\text{Root}[-Q[6,2]\,Q[7,3]\,Q[8,1] + Q[6,2]\,Q[8,1]\,\sharp 1 - 2\,Q[7,3]\,\sharp 1^2 + \sharp 1^3\,\&, 3]\}$

Char Polyn=$z^3 - 2\,z^2\,Q[7,3] + z\,Q[6,2]\,Q[8,1] - Q[6,2]\,Q[7,3]\,Q[8,1]$

1 connected components

Jacobian={{0, -Q[6, 2], 0}, {Q[8, 1], 0, -Q[7, 3]}, {-Q[8, 1], 0, 2 Q[7, 3]}}

Stability conditions

1

(Q[8, 1] < 0 && Q[7, 3] < 0 && Q[6, 2] < 0) || (Q[8, 1] > 0 && Q[7, 3] < 0 && Q[6, 2] > 0)

2

(Q[8, 1] < 0 && Q[6, 2] < 0 && Q[7, 3] < 0) || (Q[8, 1] > 0 && Q[6, 2] > 0 && Q[7, 3] < 0)

3

Q[7, 3] < 0 && ((Q[6, 2] < 0 && Q[8, 1] < 0) || (Q[6, 2] > 0 && Q[8, 1] > 0))

♯27

Triplet: Q1z Q7y Q9x

Eigenvalues:
$\{\text{Root}[-Q[1,3]\,Q[7,2]\,Q[9,1] + (-4\,Q[1,3]\,Q[7,2] - Q[1,3]\,Q[9,1])\,\sharp 1 + Q[7,2]\,\sharp 1^2 + \sharp 1^3\,\&, 1],$
$\text{Root}[-Q[1,3]\,Q[7,2]\,Q[9,1] + (-4\,Q[1,3]\,Q[7,2] - Q[1,3]\,Q[9,1])\,\sharp 1 + Q[7,2]\,\sharp 1^2 + \sharp 1^3\,\&, 2],$
$\text{Root}[-Q[1,3]\,Q[7,2]\,Q[9,1] + (-4\,Q[1,3]\,Q[7,2] - Q[1,3]\,Q[9,1])\,\sharp 1 + Q[7,2]\,\sharp 1^2 + \sharp 1^3\,\&, 3]\}$

Char Polyn=$z^3 + z^2\,Q[7,2] - 4\,z\,Q[1,3]\,Q[7,2] - z\,Q[1,3]\,Q[9,1] - Q[1,3]\,Q[7,2]\,Q[9,1]$

1 connected components

Jacobian={{0, 0, -Q[1, 3]}, {0, -Q[7, 2], 2 Q[1, 3]}, {-Q[9, 1], 2 Q[7, 2], 0}}

Stability conditions

1

Q[9, 1] > 0 && Q[7, 2] > 0 && Q[1, 3] < 0

2

Q[9, 1] > 0 && Q[1, 3] < 0 && Q[7, 2] > 0

3

Q[7, 2] > 0 && Q[1, 3] < 0 && Q[9, 1] > 0

The digraphs is a tree

♯28

Triplet: Q5z Q7y Q9x

Eigenvalues:
{Root[Q[5, 3] Q[7, 2] Q[9, 1] + (2 Q[5, 3] Q[7, 2] + Q[5, 3] Q[9, 1]) ♯1 + Q[7, 2] ♯1^2 + ♯1^3 &, 1],
Root[Q[5, 3] Q[7, 2] Q[9, 1] + (2 Q[5, 3] Q[7, 2] + Q[5, 3] Q[9, 1]) ♯1 + Q[7, 2] ♯1^2 + ♯1^3 &, 2],
Root[Q[5, 3] Q[7, 2] Q[9, 1] + (2 Q[5, 3] Q[7, 2] + Q[5, 3] Q[9, 1]) ♯1 + Q[7, 2] ♯1^2 + ♯1^3 &, 3]}

Char Polyn=$z^3 + z^2$ Q[7, 2] + 2 z Q[5, 3] Q[7, 2] + z Q[5, 3] Q[9, 1] + Q[5, 3] Q[7, 2] Q[9, 1]

1 connected components

Jacobian={{0, 0, Q[5, 3]}, {0, -Q[7, 2], -Q[5, 3]}, {-Q[9, 1], 2 Q[7, 2], 0}}

Stability conditions

1

Q[9, 1] > 0 && Q[7, 2] > 0 && Q[5, 3] > 0

2

Q[9, 1] > 0 && Q[5, 3] > 0 && Q[7, 2] > 0

3

Q[7, 2] > 0 && Q[5, 3] > 0 && Q[9, 1] > 0

The digraphs is a tree

♯29

Triplet: Q1z Q8y Q9x

Eigenvalues:
{Root[Q[1, 3] Q[8, 2] Q[9, 1] + (2 Q[1, 3] Q[8, 2] - Q[1, 3] Q[9, 1]) ♯1 - Q[8, 2] ♯1^2 + ♯1^3 &, 1],
Root[Q[1, 3] Q[8, 2] Q[9, 1] + (2 Q[1, 3] Q[8, 2] - Q[1, 3] Q[9, 1]) ♯1 - Q[8, 2] ♯1^2 + ♯1^3 &, 2],
Root[Q[1, 3] Q[8, 2] Q[9, 1] + (2 Q[1, 3] Q[8, 2] - Q[1, 3] Q[9, 1]) ♯1 - Q[8, 2] ♯1^2 + ♯1^3 &, 3]}

Char Polyn=$z^3 - z^2$ Q[8, 2] + 2 z Q[1, 3] Q[8, 2] - z Q[1, 3] Q[9, 1] + Q[1, 3] Q[8, 2] Q[9, 1]

1 connected components

Jacobian={{0, 0, -Q[1, 3]}, {0, Q[8, 2], 2 Q[1, 3]}, {-Q[9, 1], -Q[8, 2], 0}}

Stability conditions

1

Q[9, 1] > 0 && Q[8, 2] < 0 && Q[1, 3] < 0

2

Q[9, 1] > 0 && Q[1, 3] < 0 && Q[8, 2] < 0

3

Q[8, 2] < 0 && Q[1, 3] < 0 && Q[9, 1] > 0

The digraphs is a tree

♯30

Triplet: Q5z Q8y Q9x

Eigenvalues:
{Root[-Q[5, 3] Q[8, 2] Q[9, 1] + (-Q[5, 3] Q[8, 2] + Q[5, 3] Q[9, 1]) #1 - Q[8, 2] #1^2 + #1^3 &, 1],
Root[-Q[5, 3] Q[8, 2] Q[9, 1] + (-Q[5, 3] Q[8, 2] + Q[5, 3] Q[9, 1]) #1 - Q[8, 2] #1^2 + #1^3 &, 2],
Root[-Q[5, 3] Q[8, 2] Q[9, 1] + (-Q[5, 3] Q[8, 2] + Q[5, 3] Q[9, 1]) #1 - Q[8, 2] #1^2 + #1^3 &, 3]}

Char Polyn=$z^3 - z^2$ Q[8, 2] - z Q[5, 3] Q[8, 2] + z Q[5, 3] Q[9, 1] - Q[5, 3] Q[8, 2] Q[9, 1]

1 connected components

Jacobian={{0, 0, Q[5, 3]}, {0, Q[8, 2], -Q[5, 3]}, {-Q[9, 1], -Q[8, 2], 0}}

Stability conditions

1

Q[9, 1] > 0 && Q[8, 2] < 0 && Q[5, 3] > 0

2

Q[9, 1] > 0 && Q[5, 3] > 0 && Q[8, 2] < 0

3

Q[8, 2] < 0 && Q[5, 3] > 0 && Q[9, 1] > 0

The digraphs is a tree

#31

Triplet: Q1y Q5z Q9x

Eigenvalues: {Root[-Q[1, 2] Q[5, 3] Q[9, 1] + Q[5, 3] Q[9, 1] #1 - 2 Q[1, 2] #1^2 + #1^3 &, 1],
Root[-Q[1, 2] Q[5, 3] Q[9, 1] + Q[5, 3] Q[9, 1] #1 - 2 Q[1, 2] #1^2 + #1^3 &, 2],
Root[-Q[1, 2] Q[5, 3] Q[9, 1] + Q[5, 3] Q[9, 1] #1 - 2 Q[1, 2] #1^2 + #1^3 &, 3]}

Char Polyn=$z^3 - 2 z^2$ Q[1, 2] + z Q[5, 3] Q[9, 1] - Q[1, 2] Q[5, 3] Q[9, 1]

1 connected components

Jacobian={{0, -Q[1, 2], Q[5, 3]}, {0, 2 Q[1, 2], -Q[5, 3]}, {-Q[9, 1], 0, 0}}

Stability conditions

1

(Q[9, 1] < 0 && Q[5, 3] < 0 && Q[1, 2] < 0) || (Q[9, 1] > 0 && Q[5, 3] > 0 && Q[1, 2] < 0)

2

(Q[9, 1] < 0 && Q[1, 2] < 0 && Q[5, 3] < 0) || (Q[9, 1] > 0 && Q[1, 2] < 0 && Q[5, 3] > 0)

3

(Q[5, 3] < 0 && Q[1, 2] < 0 && Q[9, 1] < 0) || (Q[5, 3] > 0 && Q[1, 2] < 0 && Q[9, 1] > 0)

#32

Triplet: Q1y Q7z Q9x

Eigenvalues:
{Root[Q[1, 2] Q[7, 3] Q[9, 1] + 4 Q[1, 2] Q[7, 3] #1 + (-2 Q[1, 2] - 2 Q[7, 3]) #1^2 + #1^3 &, 1],
Root[Q[1, 2] Q[7, 3] Q[9, 1] + 4 Q[1, 2] Q[7, 3] #1 + (-2 Q[1, 2] - 2 Q[7, 3]) #1^2 + #1^3 &, 2],
Root[Q[1, 2] Q[7, 3] Q[9, 1] + 4 Q[1, 2] Q[7, 3] #1 + (-2 Q[1, 2] - 2 Q[7, 3]) #1^2 + #1^3 &, 3]}

Char Polyn=$z^3 - 2 z^2 Q[1, 2] - 2 z^2 Q[7, 3] + 4 z Q[1, 2] Q[7, 3] + Q[1, 2] Q[7, 3] Q[9, 1]$

1 connected components

Jacobian={{0, -Q[1, 2], 0}, {0, 2 Q[1, 2], -Q[7, 3]}, {-Q[9, 1], 0, 2 Q[7, 3]}}

Stability conditions

1

$$Q[9, 1] > 0 \,\&\&\, \left(\left(Q[7, 3] \leq -\frac{1}{8} Q[9, 1] \,\&\&\, Q[1, 2] < 0\right) \,||\, \left(-\frac{1}{8} Q[9, 1] < Q[7, 3] < 0 \,\&\&\, Q[1, 2] < \frac{1}{8} (-8 Q[7, 3] - Q[9, 1])\right)\right)$$

2

$$Q[9, 1] > 0 \,\&\&\, \left(\left(Q[1, 2] \leq -\frac{1}{8} Q[9, 1] \,\&\&\, Q[7, 3] < 0\right) \,||\, \left(-\frac{1}{8} Q[9, 1] < Q[1, 2] < 0 \,\&\&\, Q[7, 3] < \frac{1}{8} (-8 Q[1, 2] - Q[9, 1])\right)\right)$$

3

$$Q[7, 3] < 0 \,\&\&\, Q[1, 2] < 0 \,\&\&\, 0 < Q[9, 1] < -8 Q[1, 2] - 8 Q[7, 3]$$

♯33

Triplet: Q5y Q7z Q9x

Eigenvalues:

$$\{\text{Root}[-Q[5, 2] Q[7, 3] Q[9, 1] - 2 Q[5, 2] Q[7, 3] \sharp 1 + (Q[5, 2] - 2 Q[7, 3]) \sharp 1^2 + \sharp 1^3 \&, 1],$$
$$\text{Root}[-Q[5, 2] Q[7, 3] Q[9, 1] - 2 Q[5, 2] Q[7, 3] \sharp 1 + (Q[5, 2] - 2 Q[7, 3]) \sharp 1^2 + \sharp 1^3 \&, 2],$$
$$\text{Root}[-Q[5, 2] Q[7, 3] Q[9, 1] - 2 Q[5, 2] Q[7, 3] \sharp 1 + (Q[5, 2] - 2 Q[7, 3]) \sharp 1^2 + \sharp 1^3 \&, 3]\}$$

Char Polyn=$z^3 + z^2 Q[5, 2] - 2 z^2 Q[7, 3] - 2 z Q[5, 2] Q[7, 3] - Q[5, 2] Q[7, 3] Q[9, 1]$

1 connected components

Jacobian={{0, Q[5, 2], 0}, {0, -Q[5, 2], -Q[7, 3]}, {-Q[9, 1], 0, 2 Q[7, 3]}}

Stability conditions

1

$$Q[9, 1] > 0 \,\&\&\, \left(\left(Q[7, 3] \leq -\frac{1}{4} Q[9, 1] \,\&\&\, Q[5, 2] > 0\right) \,||\, \left(-\frac{1}{4} Q[9, 1] < Q[7, 3] < 0 \,\&\&\, Q[5, 2] > \frac{1}{2} (4 Q[7, 3] + Q[9, 1])\right)\right)$$

2

$$Q[9, 1] > 0 \,\&\&\, \left(\left(0 < Q[5, 2] \leq \frac{1}{2} Q[9, 1] \,\&\&\, Q[7, 3] < \frac{1}{4} (2 Q[5, 2] - Q[9, 1])\right) \,||\, \left(Q[5, 2] > \frac{1}{2} Q[9, 1] \,\&\&\, Q[7, 3] < 0\right)\right)$$

3

$$Q[7, 3] < 0 \,\&\&\, Q[5, 2] > 0 \,\&\&\, 0 < Q[9, 1] < 2 Q[5, 2] - 4 Q[7, 3]$$

♯34

Triplet: Q1y Q8z Q9x

Eigenvalues:

$\{\text{Root}[-Q[1,2]\,Q[8,3]\,Q[9,1]-2\,Q[1,2]\,Q[8,3]\,\#1+(-2\,Q[1,2]+Q[8,3])\,\#1^2+\#1^3\,\&,1],$
$\text{Root}[-Q[1,2]\,Q[8,3]\,Q[9,1]-2\,Q[1,2]\,Q[8,3]\,\#1+(-2\,Q[1,2]+Q[8,3])\,\#1^2+\#1^3\,\&,2],$
$\text{Root}[-Q[1,2]\,Q[8,3]\,Q[9,1]-2\,Q[1,2]\,Q[8,3]\,\#1+(-2\,Q[1,2]+Q[8,3])\,\#1^2+\#1^3\,\&,3]\}$

Char Polyn=$z^3-2\,z^2\,Q[1,2]+z^2\,Q[8,3]-2\,z\,Q[1,2]\,Q[8,3]-Q[1,2]\,Q[8,3]\,Q[9,1]$

1 connected components

Jacobian={{0, -Q[1, 2], 0}, {0, 2 Q[1, 2], Q[8, 3]}, {-Q[9, 1], 0, -Q[8, 3]}}

Stability conditions

1

$Q[9,1]>0\ \&\&\ \left(\left(0<Q[8,3]\le\frac{1}{2}Q[9,1]\ \&\&\ Q[1,2]<\frac{1}{4}(2\,Q[8,3]-Q[9,1])\right)\ ||\ \left(Q[8,3]>\frac{1}{2}Q[9,1]\ \&\&\ Q[1,2]<0\right)\right)$

2

$Q[9,1]>0\ \&\&\ \left(\left(Q[1,2]\le-\frac{1}{4}Q[9,1]\ \&\&\ Q[8,3]>0\right)\ ||\ \left(-\frac{1}{4}Q[9,1]<Q[1,2]<0\ \&\&\ Q[8,3]>\frac{1}{2}(4\,Q[1,2]+Q[9,1])\right)\right)$

3

$Q[8,3]>0\ \&\&\ Q[1,2]<0\ \&\&\ 0<Q[9,1]<-4\,Q[1,2]+2\,Q[8,3]$

#35

Triplet: Q5y Q8z Q9x

Eigenvalues:

$\{\text{Root}[Q[5,2]\,Q[8,3]\,Q[9,1]+Q[5,2]\,Q[8,3]\,\#1+(Q[5,2]+Q[8,3])\,\#1^2+\#1^3\,\&,1],$
$\text{Root}[Q[5,2]\,Q[8,3]\,Q[9,1]+Q[5,2]\,Q[8,3]\,\#1+(Q[5,2]+Q[8,3])\,\#1^2+\#1^3\,\&,2],$
$\text{Root}[Q[5,2]\,Q[8,3]\,Q[9,1]+Q[5,2]\,Q[8,3]\,\#1+(Q[5,2]+Q[8,3])\,\#1^2+\#1^3\,\&,3]\}$

Char Polyn=$z^3+z^2\,Q[5,2]+z^2\,Q[8,3]+z\,Q[5,2]\,Q[8,3]+Q[5,2]\,Q[8,3]\,Q[9,1]$

1 connected components

Jacobian={{0, Q[5, 2], 0}, {0, -Q[5, 2], Q[8, 3]}, {-Q[9, 1], 0, -Q[8, 3]}}

Stability conditions

1

$Q[9,1]>0\ \&\&\ ((0<Q[8,3]\le Q[9,1]\ \&\&\ Q[5,2]>-Q[8,3]+Q[9,1])\ ||\ (Q[8,3]>Q[9,1]\ \&\&\ Q[5,2]>0))$

2

$Q[9,1]>0\ \&\&\ ((0<Q[5,2]\le Q[9,1]\ \&\&\ Q[8,3]>-Q[5,2]+Q[9,1])\ ||\ (Q[5,2]>Q[9,1]\ \&\&\ Q[8,3]>0))$

3

$Q[8,3]>0\ \&\&\ Q[5,2]>0\ \&\&\ 0<Q[9,1]<Q[5,2]+Q[8,3]$

♯36

Triplet: Q1z Q7y Q10x

Eigenvalues: {Root[
Q[1, 3] Q[7, 2] Q[10, 1] + (-4 Q[1, 3] Q[7, 2] + Q[1, 3] Q[10, 1]) ♯1 + Q[7, 2] ♯1^2 + ♯1^3 &, 1],
Root[Q[1, 3] Q[7, 2] Q[10, 1] + (-4 Q[1, 3] Q[7, 2] + Q[1, 3] Q[10, 1]) ♯1 + Q[7, 2] ♯1^2 + ♯1^3 &,
2], Root[
Q[1, 3] Q[7, 2] Q[10, 1] + (-4 Q[1, 3] Q[7, 2] + Q[1, 3] Q[10, 1]) ♯1 + Q[7, 2] ♯1^2 + ♯1^3 &, 3]}

Char Polyn=z^3 + z^2 Q[7, 2] - 4 z Q[1, 3] Q[7, 2] + z Q[1, 3] Q[10, 1] + Q[1, 3] Q[7, 2] Q[10, 1]

1 connected components

Jacobian={{0, 0, -Q[1, 3]}, {0, -Q[7, 2], 2 Q[1, 3]}, {Q[10, 1], 2 Q[7, 2], 0}}

Stability conditions

1

Q[10, 1] < 0 && Q[7, 2] > 0 && Q[1, 3] < 0

2

Q[10, 1] < 0 && Q[1, 3] < 0 && Q[7, 2] > 0

3

Q[7, 2] > 0 && Q[1, 3] < 0 && Q[10, 1] < 0

The digraphs is a tree

♯37

Triplet: Q5z Q7y Q10x

Eigenvalues: {Root[
-Q[5, 3] Q[7, 2] Q[10, 1] + (2 Q[5, 3] Q[7, 2] - Q[5, 3] Q[10, 1]) ♯1 + Q[7, 2] ♯1^2 + ♯1^3 &, 1],
Root[-Q[5, 3] Q[7, 2] Q[10, 1] + (2 Q[5, 3] Q[7, 2] - Q[5, 3] Q[10, 1]) ♯1 + Q[7, 2] ♯1^2 + ♯1^3 &,
2], Root[
-Q[5, 3] Q[7, 2] Q[10, 1] + (2 Q[5, 3] Q[7, 2] - Q[5, 3] Q[10, 1]) ♯1 + Q[7, 2] ♯1^2 + ♯1^3 &, 3]}

Char Polyn=z^3 + z^2 Q[7, 2] + 2 z Q[5, 3] Q[7, 2] - z Q[5, 3] Q[10, 1] - Q[5, 3] Q[7, 2] Q[10, 1]

1 connected components

Jacobian={{0, 0, Q[5, 3]}, {0, -Q[7, 2], -Q[5, 3]}, {Q[10, 1], 2 Q[7, 2], 0}}

Stability conditions

1

Q[10, 1] < 0 && Q[7, 2] > 0 && Q[5, 3] > 0

2

Q[10, 1] < 0 && Q[5, 3] > 0 && Q[7, 2] > 0

3

Q[7, 2] > 0 && Q[5, 3] > 0 && Q[10, 1] < 0

The digraphs is a tree

⌗38

Triplet: Q1z Q8y Q10x

Eigenvalues: {Root[
-Q[1, 3] Q[8, 2] Q[10, 1] + (2 Q[1, 3] Q[8, 2] + Q[1, 3] Q[10, 1]) ⌗1 - Q[8, 2] ⌗1^2 + ⌗1^3 &, 1],
Root[-Q[1, 3] Q[8, 2] Q[10, 1] + (2 Q[1, 3] Q[8, 2] + Q[1, 3] Q[10, 1]) ⌗1 - Q[8, 2] ⌗1^2 + ⌗1^3 &,
2], Root[
-Q[1, 3] Q[8, 2] Q[10, 1] + (2 Q[1, 3] Q[8, 2] + Q[1, 3] Q[10, 1]) ⌗1 - Q[8, 2] ⌗1^2 + ⌗1^3 &, 3]}

Char Polyn=z^3 - z^2 Q[8, 2] + 2 z Q[1, 3] Q[8, 2] + z Q[1, 3] Q[10, 1] - Q[1, 3] Q[8, 2] Q[10, 1]

1 connected components

Jacobian={{0, 0, -Q[1, 3]}, {0, Q[8, 2], 2 Q[1, 3]}, {Q[10, 1], -Q[8, 2], 0}}

Stability conditions

1

Q[10, 1] < 0 && Q[8, 2] < 0 && Q[1, 3] < 0

2

Q[10, 1] < 0 && Q[1, 3] < 0 && Q[8, 2] < 0

3

Q[8, 2] < 0 && Q[1, 3] < 0 && Q[10, 1] < 0

The digraphs is a tree

⌗39

Triplet: Q5z Q8y Q10x

Eigenvalues:
{Root[Q[5, 3] Q[8, 2] Q[10, 1] + (-Q[5, 3] Q[8, 2] - Q[5, 3] Q[10, 1]) ⌗1 - Q[8, 2] ⌗1^2 + ⌗1^3 &, 1],
Root[Q[5, 3] Q[8, 2] Q[10, 1] + (-Q[5, 3] Q[8, 2] - Q[5, 3] Q[10, 1]) ⌗1 - Q[8, 2] ⌗1^2 + ⌗1^3 &, 2],
Root[Q[5, 3] Q[8, 2] Q[10, 1] + (-Q[5, 3] Q[8, 2] - Q[5, 3] Q[10, 1]) ⌗1 - Q[8, 2] ⌗1^2 + ⌗1^3 &, 3]}

Char Polyn=z^3 - z^2 Q[8, 2] - z Q[5, 3] Q[8, 2] - z Q[5, 3] Q[10, 1] + Q[5, 3] Q[8, 2] Q[10, 1]

1 connected components

Jacobian={{0, 0, Q[5, 3]}, {0, Q[8, 2], -Q[5, 3]}, {Q[10, 1], -Q[8, 2], 0}}

Stability conditions

1

Q[10, 1] < 0 && Q[8, 2] < 0 && Q[5, 3] > 0

2

Q[10, 1] < 0 && Q[5, 3] > 0 && Q[8, 2] < 0

3

Q[8, 2] < 0 && Q[5, 3] > 0 && Q[10, 1] < 0

The digraphs is a tree

⌗40

Triplet: Q1y Q5z Q10x

Eigenvalues: {Root[Q[1, 2] Q[5, 3] Q[10, 1] - Q[5, 3] Q[10, 1] #1 - 2 Q[1, 2] #1^2 + #1^3 &, 1],
Root[Q[1, 2] Q[5, 3] Q[10, 1] - Q[5, 3] Q[10, 1] #1 - 2 Q[1, 2] #1^2 + #1^3 &, 2],
Root[Q[1, 2] Q[5, 3] Q[10, 1] - Q[5, 3] Q[10, 1] #1 - 2 Q[1, 2] #1^2 + #1^3 &, 3]}

Char Polyn=z^3 - 2 z^2 Q[1, 2] - z Q[5, 3] Q[10, 1] + Q[1, 2] Q[5, 3] Q[10, 1]

1 connected components

Jacobian={{0, -Q[1, 2], Q[5, 3]}, {0, 2 Q[1, 2], -Q[5, 3]}, {Q[10, 1], 0, 0}}

Stability conditions

1

(Q[10, 1] < 0 && Q[5, 3] > 0 && Q[1, 2] < 0) || (Q[10, 1] > 0 && Q[5, 3] < 0 && Q[1, 2] < 0)

2

(Q[10, 1] < 0 && Q[1, 2] < 0 && Q[5, 3] > 0) || (Q[10, 1] > 0 && Q[1, 2] < 0 && Q[5, 3] < 0)

3

(Q[5, 3] < 0 && Q[1, 2] < 0 && Q[10, 1] > 0) || (Q[5, 3] > 0 && Q[1, 2] < 0 && Q[10, 1] < 0)

#41

Triplet: Q1y Q7z Q10x

Eigenvalues:
{Root[-Q[1, 2] Q[7, 3] Q[10, 1] + 4 Q[1, 2] Q[7, 3] #1 + (-2 Q[1, 2] - 2 Q[7, 3]) #1^2 + #1^3 &, 1],
Root[-Q[1, 2] Q[7, 3] Q[10, 1] + 4 Q[1, 2] Q[7, 3] #1 + (-2 Q[1, 2] - 2 Q[7, 3]) #1^2 + #1^3 &, 2],
Root[-Q[1, 2] Q[7, 3] Q[10, 1] + 4 Q[1, 2] Q[7, 3] #1 + (-2 Q[1, 2] - 2 Q[7, 3]) #1^2 + #1^3 &, 3]}

Char Polyn=z^3 - 2 z^2 Q[1, 2] - 2 z^2 Q[7, 3] + 4 z Q[1, 2] Q[7, 3] - Q[1, 2] Q[7, 3] Q[10, 1]

1 connected components

Jacobian={{0, -Q[1, 2], 0}, {0, 2 Q[1, 2], -Q[7, 3]}, {Q[10, 1], 0, 2 Q[7, 3]}}

Stability conditions

1

$Q[10, 1] < 0 \ \&\& \left(\left(Q[7, 3] \le \frac{1}{8} Q[10, 1] \ \&\& \ Q[1, 2] < 0\right) \ || \ \left(\frac{1}{8} Q[10, 1] < Q[7, 3] < 0 \ \&\& \ Q[1, 2] < \frac{1}{8} (-8 Q[7, 3] + Q[10, 1])\right)\right)$

2

$Q[10, 1] < 0 \ \&\& \left(\left(Q[1, 2] \le \frac{1}{8} Q[10, 1] \ \&\& \ Q[7, 3] < 0\right) \ || \ \left(\frac{1}{8} Q[10, 1] < Q[1, 2] < 0 \ \&\& \ Q[7, 3] < \frac{1}{8} (-8 Q[1, 2] + Q[10, 1])\right)\right)$

3

Q[7, 3] < 0 && Q[1, 2] < 0 && 8 Q[1, 2] + 8 Q[7, 3] < Q[10, 1] < 0

#42

Triplet: Q5y Q7z Q10x

Eigenvalues:
{Root[Q[5, 2] Q[7, 3] Q[10, 1] - 2 Q[5, 2] Q[7, 3] #1 + (Q[5, 2] - 2 Q[7, 3]) #1^2 + #1^3 &, 1],
Root[Q[5, 2] Q[7, 3] Q[10, 1] - 2 Q[5, 2] Q[7, 3] #1 + (Q[5, 2] - 2 Q[7, 3]) #1^2 + #1^3 &, 2],
Root[Q[5, 2] Q[7, 3] Q[10, 1] - 2 Q[5, 2] Q[7, 3] #1 + (Q[5, 2] - 2 Q[7, 3]) #1^2 + #1^3 &, 3]}

Char Polyn=$z^3 + z^2$ Q[5, 2] - 2 z^2 Q[7, 3] - 2 z Q[5, 2] Q[7, 3] + Q[5, 2] Q[7, 3] Q[10, 1]

1 connected components

Jacobian={{0, Q[5, 2], 0}, {0, -Q[5, 2], -Q[7, 3]}, {Q[10, 1], 0, 2 Q[7, 3]}}

Stability conditions

1

$$Q[10,1] < 0 \,\&\&\, \left(\left(Q[7,3] \le \frac{1}{4} Q[10,1] \,\&\&\, Q[5,2] > 0\right) \,||\, \left(\frac{1}{4} Q[10,1] < Q[7,3] < 0 \,\&\&\, Q[5,2] > \frac{1}{2}(4 Q[7,3] - Q[10,1])\right)\right)$$

2

$$Q[10,1] < 0 \,\&\&\, \left(\left(0 < Q[5,2] \le -\frac{1}{2} Q[10,1] \,\&\&\, Q[7,3] < \frac{1}{4}(2 Q[5,2] + Q[10,1])\right) \,||\, \left(Q[5,2] > -\frac{1}{2} Q[10,1] \,\&\&\, Q[7,3] < 0\right)\right)$$

3

Q[7, 3] < 0 && Q[5, 2] > 0 && -2 Q[5, 2] + 4 Q[7, 3] < Q[10, 1] < 0

#43

Triplet: Q1y Q8z Q10x

Eigenvalues:
{Root[Q[1, 2] Q[8, 3] Q[10, 1] - 2 Q[1, 2] Q[8, 3] #1 + (-2 Q[1, 2] + Q[8, 3]) #1^2 + #1^3 &, 1],
Root[Q[1, 2] Q[8, 3] Q[10, 1] - 2 Q[1, 2] Q[8, 3] #1 + (-2 Q[1, 2] + Q[8, 3]) #1^2 + #1^3 &, 2],
Root[Q[1, 2] Q[8, 3] Q[10, 1] - 2 Q[1, 2] Q[8, 3] #1 + (-2 Q[1, 2] + Q[8, 3]) #1^2 + #1^3 &, 3]}

Char Polyn=z^3 - 2 z^2 Q[1, 2] + z^2 Q[8, 3] - 2 z Q[1, 2] Q[8, 3] + Q[1, 2] Q[8, 3] Q[10, 1]

1 connected components

Jacobian={{0, -Q[1, 2], 0}, {0, 2 Q[1, 2], Q[8, 3]}, {Q[10, 1], 0, -Q[8, 3]}}

Stability conditions

1

$$Q[10,1] < 0 \,\&\&\, \left(\left(0 < Q[8,3] \le -\frac{1}{2} Q[10,1] \,\&\&\, Q[1,2] < \frac{1}{4}(2 Q[8,3] + Q[10,1])\right) \,||\, \left(Q[8,3] > -\frac{1}{2} Q[10,1] \,\&\&\, Q[1,2] < 0\right)\right)$$

2

$$Q[10,1] < 0 \,\&\&\, \left(\left(Q[1,2] \le \frac{1}{4} Q[10,1] \,\&\&\, Q[8,3] > 0\right) \,||\, \left(\frac{1}{4} Q[10,1] < Q[1,2] < 0 \,\&\&\, Q[8,3] > \frac{1}{2}(4 Q[1,2] - Q[10,1])\right)\right)$$

3

Q[8, 3] > 0 && Q[1, 2] < 0 && 4 Q[1, 2] - 2 Q[8, 3] < Q[10, 1] < 0

⌗44

Triplet: Q5y Q8z Q10x

Eigenvalues:
{Root[-Q[5, 2] Q[8, 3] Q[10, 1] + Q[5, 2] Q[8, 3] ⌗1 + (Q[5, 2] + Q[8, 3]) ⌗1^2 + ⌗1^3 &, 1],
Root[-Q[5, 2] Q[8, 3] Q[10, 1] + Q[5, 2] Q[8, 3] ⌗1 + (Q[5, 2] + Q[8, 3]) ⌗1^2 + ⌗1^3 &, 2],
Root[-Q[5, 2] Q[8, 3] Q[10, 1] + Q[5, 2] Q[8, 3] ⌗1 + (Q[5, 2] + Q[8, 3]) ⌗1^2 + ⌗1^3 &, 3]}

Char Polyn=$z^3 + z^2$ Q[5, 2] + z^2 Q[8, 3] + z Q[5, 2] Q[8, 3] - Q[5, 2] Q[8, 3] Q[10, 1]

1 connected components

Jacobian={{0, Q[5, 2], 0}, {0, -Q[5, 2], Q[8, 3]}, {Q[10, 1], 0, -Q[8, 3]}}

Stability conditions

1

Q[10, 1] < 0 &&
((0 < Q[8, 3] ≤ -Q[10, 1] && Q[5, 2] > -Q[8, 3] - Q[10, 1]) || (Q[8, 3] > -Q[10, 1] && Q[5, 2] > 0))

2

Q[10, 1] < 0 &&
((0 < Q[5, 2] ≤ -Q[10, 1] && Q[8, 3] > -Q[5, 2] - Q[10, 1]) || (Q[5, 2] > -Q[10, 1] && Q[8, 3] > 0))

3

Q[8, 3] > 0 && Q[5, 2] > 0 && -Q[5, 2] - Q[8, 3] < Q[10, 1] < 0

⌗45

Triplet: Q1z Q3x Q7y

Eigenvalues: {Root[-2 Q[1, 3] Q[3, 1] Q[7, 2] - 4 Q[1, 3] Q[7, 2] ⌗1 + Q[7, 2] ⌗1^2 + ⌗1^3 &, 1],
Root[-2 Q[1, 3] Q[3, 1] Q[7, 2] - 4 Q[1, 3] Q[7, 2] ⌗1 + Q[7, 2] ⌗1^2 + ⌗1^3 &, 2],
Root[-2 Q[1, 3] Q[3, 1] Q[7, 2] - 4 Q[1, 3] Q[7, 2] ⌗1 + Q[7, 2] ⌗1^2 + ⌗1^3 &, 3]}

Char Polyn=$z^3 + z^2$ Q[7, 2] - 4 z Q[1, 3] Q[7, 2] - 2 Q[1, 3] Q[3, 1] Q[7, 2]

1 connected components

Jacobian={{0, 0, -Q[1, 3]}, {-Q[3, 1], -Q[7, 2], 2 Q[1, 3]}, {0, 2 Q[7, 2], 0}}

Stability conditions

1

Q[7, 2] > 0 && 0 < Q[3, 1] < 2 Q[7, 2] && Q[1, 3] < 0

2

Q[7, 2] > 0 && Q[1, 3] < 0 && 0 < Q[3, 1] < 2 Q[7, 2]

3

Q[3, 1] > 0 && Q[1, 3] < 0 && Q[7, 2] > $\frac{1}{2}$ Q[3, 1]

⌗46

Triplet: Q1z Q4x Q7y

Eigenvalues: {Root[2 Q[1, 3] Q[4, 1] Q[7, 2] - 4 Q[1, 3] Q[7, 2] #1 + Q[7, 2] #1^2 + #1^3 &, 1],
Root[2 Q[1, 3] Q[4, 1] Q[7, 2] - 4 Q[1, 3] Q[7, 2] #1 + Q[7, 2] #1^2 + #1^3 &, 2],
Root[2 Q[1, 3] Q[4, 1] Q[7, 2] - 4 Q[1, 3] Q[7, 2] #1 + Q[7, 2] #1^2 + #1^3 &, 3]}

Char Polyn=z^3 + z^2 Q[7, 2] - 4 z Q[1, 3] Q[7, 2] + 2 Q[1, 3] Q[4, 1] Q[7, 2]

1 connected components

Jacobian={{0, 0, -Q[1, 3]}, {Q[4, 1], -Q[7, 2], 2 Q[1, 3]}, {0, 2 Q[7, 2], 0}}

Stability conditions

1

Q[7, 2] > 0 && -2 Q[7, 2] < Q[4, 1] < 0 && Q[1, 3] < 0

2

Q[7, 2] > 0 && Q[1, 3] < 0 && -2 Q[7, 2] < Q[4, 1] < 0

3

$Q[4, 1] < 0 \;\&\&\; Q[1, 3] < 0 \;\&\&\; Q[7, 2] > -\frac{1}{2} Q[4, 1]$

#47

Triplet: Q1z Q5x Q7y

Eigenvalues: {Root[2 Q[1, 3] Q[5, 1] Q[7, 2] +
(-4 Q[1, 3] Q[7, 2] - Q[5, 1] Q[7, 2]) #1 + (-Q[5, 1] + Q[7, 2]) #1^2 + #1^3 &, 1],
Root[2 Q[1, 3] Q[5, 1] Q[7, 2] + (-4 Q[1, 3] Q[7, 2] - Q[5, 1] Q[7, 2]) #1 +
(-Q[5, 1] + Q[7, 2]) #1^2 + #1^3 &, 2], Root[2 Q[1, 3] Q[5, 1] Q[7, 2] +
(-4 Q[1, 3] Q[7, 2] - Q[5, 1] Q[7, 2]) #1 + (-Q[5, 1] + Q[7, 2]) #1^2 + #1^3 &, 3]}

Char Polyn=
z^3 - z^2 Q[5, 1] + z^2 Q[7, 2] - 4 z Q[1, 3] Q[7, 2] - z Q[5, 1] Q[7, 2] + 2 Q[1, 3] Q[5, 1] Q[7, 2]

1 connected components

Jacobian={{Q[5, 1], 0, -Q[1, 3]}, {-Q[5, 1], -Q[7, 2], 2 Q[1, 3]}, {0, 2 Q[7, 2], 0}}

Stability conditions

1

$$\left(Q[7,2] < 0 \;\&\&\; Q[5,1] < 2 Q[7,2] \;\&\&\; Q[1,3] > \frac{-Q[5,1]^2 + Q[5,1]\, Q[7,2]}{2 Q[5,1] - 4 Q[7,2]}\right) \;||\; (Q[7,2] > 0 \;\&\&\; Q[5,1] < 0 \;\&\&\; Q[1,3] < 0)$$

2

$$\left(Q[7,2] < 0 \;\&\&\; Q[1,3] > -\frac{3}{2} Q[7,2] + \sqrt{2}\sqrt{Q[7,2]^2} \;\&\&\; \frac{1}{2}(-2 Q[1,3] + Q[7,2]) - \frac{1}{2}\sqrt{4 Q[1,3]^2 + 12 Q[1,3]\, Q[7,2] + Q[7,2]^2} < Q[5,1] < \frac{1}{2}(-2 Q[1,3] + Q[7,2]) + \frac{1}{2}\sqrt{4 Q[1,3]^2 + 12 Q[1,3]\, Q[7,2] + Q[7,2]^2}\right) \;||\; (Q[7,2] > 0 \;\&\&\; Q[1,3] < 0 \;\&\&\; Q[5,1] < 0)$$

3

$Q[5,1] < 0 \,\&\&\, \left((Q[1,3] < 0 \,\&\&\, Q[7,2] > 0) \,||\, \left(Q[1,3] > -\frac{1}{2} Q[5,1] \,\&\&\, \frac{2 Q[1,3] Q[5,1] + Q[5,1]^2}{4 Q[1,3] + Q[5,1]} < Q[7,2] < 0 \right) \right)$

♯48

Triplet: Q2z Q5x Q7y

Eigenvalues:

$\{\text{Root}[2 Q[2,3] Q[5,1] Q[7,2] - Q[5,1] Q[7,2] \sharp1 + (-Q[5,1] + Q[7,2]) \sharp1^2 + \sharp1^3 \&, 1],$
$\text{Root}[2 Q[2,3] Q[5,1] Q[7,2] - Q[5,1] Q[7,2] \sharp1 + (-Q[5,1] + Q[7,2]) \sharp1^2 + \sharp1^3 \&, 2],$
$\text{Root}[2 Q[2,3] Q[5,1] Q[7,2] - Q[5,1] Q[7,2] \sharp1 + (-Q[5,1] + Q[7,2]) \sharp1^2 + \sharp1^3 \&, 3]\}$

Char Polyn= $z^3 - z^2 Q[5,1] + z^2 Q[7,2] - z Q[5,1] Q[7,2] + 2 Q[2,3] Q[5,1] Q[7,2]$

1 connected components

Jacobian= $\{\{Q[5,1], 0, Q[2,3]\}, \{-Q[5,1], -Q[7,2], 0\}, \{0, 2 Q[7,2], 0\}\}$

Stability conditions

1

$Q[7,2] > 0 \,\&\&\, Q[5,1] < 0 \,\&\&\, \frac{1}{2} (Q[5,1] - Q[7,2]) < Q[2,3] < 0$

2

$Q[7,2] > 0 \,\&\&\, \left(\left(Q[2,3] \le -\frac{1}{2} Q[7,2] \,\&\&\, Q[5,1] < 2 Q[2,3] + Q[7,2] \right) \,||\, \left(-\frac{1}{2} Q[7,2] < Q[2,3] < 0 \,\&\&\, Q[5,1] < 0 \right) \right)$

3

$Q[5,1] < 0 \,\&\&\, \left(\left(Q[2,3] \le \frac{1}{2} Q[5,1] \,\&\&\, Q[7,2] > -2 Q[2,3] + Q[5,1] \right) \,||\, \left(\frac{1}{2} Q[5,1] < Q[2,3] < 0 \,\&\&\, Q[7,2] > 0 \right) \right)$

♯49

Triplet: Q1x Q2z Q7y

Eigenvalues:

$\{\text{Root}[-4 Q[1,1] Q[2,3] Q[7,2] + Q[1,1] Q[7,2] \sharp1 + (Q[1,1] + Q[7,2]) \sharp1^2 + \sharp1^3 \&, 1],$
$\text{Root}[-4 Q[1,1] Q[2,3] Q[7,2] + Q[1,1] Q[7,2] \sharp1 + (Q[1,1] + Q[7,2]) \sharp1^2 + \sharp1^3 \&, 2],$
$\text{Root}[-4 Q[1,1] Q[2,3] Q[7,2] + Q[1,1] Q[7,2] \sharp1 + (Q[1,1] + Q[7,2]) \sharp1^2 + \sharp1^3 \&, 3]\}$

Char Polyn= $z^3 + z^2 Q[1,1] + z^2 Q[7,2] + z Q[1,1] Q[7,2] - 4 Q[1,1] Q[2,3] Q[7,2]$

1 connected components

Jacobian= $\{\{-Q[1,1], 0, Q[2,3]\}, \{2 Q[1,1], -Q[7,2], 0\}, \{0, 2 Q[7,2], 0\}\}$

Stability conditions

1

$Q[7,2] > 0 \&\& \left(\left(Q[2,3] \leq -\frac{1}{4} Q[7,2] \&\& Q[1,1] > -4 Q[2,3] - Q[7,2]\right) \,||\, \left(-\frac{1}{4} Q[7,2] < Q[2,3] < 0 \&\& Q[1,1] > 0\right)\right)$

2

$Q[7,2] > 0 \&\& Q[1,1] > 0 \&\& \frac{1}{4} (-Q[1,1] - Q[7,2]) < Q[2,3] < 0$

3

$Q[2,3] < 0 \&\& ((0 < Q[1,1] \leq -4 Q[2,3] \&\& Q[7,2] > -Q[1,1] - 4 Q[2,3]) \,||\, (Q[1,1] > -4 Q[2,3] \&\& Q[7,2] > 0))$

#50

Triplet: Q1x Q5z Q7y

Eigenvalues: $\{\text{Root}[-2 Q[1,1] Q[5,3] Q[7,2] + (Q[1,1] Q[7,2] + 2 Q[5,3] Q[7,2]) \#1 + (Q[1,1] + Q[7,2]) \#1^2 + \#1^3 \&, 1],$
$\text{Root}[-2 Q[1,1] Q[5,3] Q[7,2] + (Q[1,1] Q[7,2] + 2 Q[5,3] Q[7,2]) \#1 + (Q[1,1] + Q[7,2]) \#1^2 + \#1^3 \&, 2], \text{Root}[-2 Q[1,1] Q[5,3] Q[7,2] + (Q[1,1] Q[7,2] + 2 Q[5,3] Q[7,2]) \#1 + (Q[1,1] + Q[7,2]) \#1^2 + \#1^3 \&, 3]\}$

Char Polyn=
$z^3 + z^2 Q[1,1] + z^2 Q[7,2] + z Q[1,1] Q[7,2] + 2 z Q[5,3] Q[7,2] - 2 Q[1,1] Q[5,3] Q[7,2]$

1 connected components

Jacobian={{-Q[1, 1], 0, Q[5, 3]}, {2 Q[1, 1], -Q[7, 2], -Q[5, 3]}, {0, 2 Q[7, 2], 0}}

Stability conditions

1

$Q[7,2] > 0 \&\& \left(\left(Q[5,3] < 0 \&\& Q[1,1] > \frac{1}{2} (-4 Q[5,3] - Q[7,2]) + \frac{1}{2} \sqrt{16 Q[5,3]^2 + Q[7,2]^2}\right) \,||\, \left(Q[5,3] > 0 \&\& \frac{1}{2} (-4 Q[5,3] - Q[7,2]) + \frac{1}{2} \sqrt{16 Q[5,3]^2 + Q[7,2]^2} < Q[1,1] < 0\right)\right)$

2

$Q[7,2] > 0 \&\& \left(\left(-\frac{1}{2} Q[7,2] < Q[1,1] < 0 \&\& Q[5,3] > \frac{-Q[1,1]^2 - Q[1,1] Q[7,2]}{4 Q[1,1] + 2 Q[7,2]}\right) \,||\, \left(Q[1,1] > 0 \&\& \frac{-Q[1,1]^2 - Q[1,1] Q[7,2]}{4 Q[1,1] + 2 Q[7,2]} < Q[5,3] < 0\right)\right)$

3

$\left(Q[5,3] < 0 \&\& \left(\left(-2 Q[5,3] < Q[1,1] \leq -4 Q[5,3] \&\& Q[7,2] > \frac{-Q[1,1]^2 - 4 Q[1,1] Q[5,3]}{Q[1,1] + 2 Q[5,3]}\right) \,||\, (Q[1,1] > -4 Q[5,3] \&\& Q[7,2] > 0)\right)\right) \,||\, \left(Q[5,3] > 0 \&\& -2 Q[5,3] < Q[1,1] < 0 \&\& Q[7,2] > \frac{-Q[1,1]^2 - 4 Q[1,1] Q[5,3]}{Q[1,1] + 2 Q[5,3]}\right)$

#51

Triplet: Q3x Q5z Q7y

Eigenvalues: {Root[2 Q[3, 1] Q[5, 3] Q[7, 2] + 2 Q[5, 3] Q[7, 2] #1 + Q[7, 2] #1^2 + #1^3 &, 1],
Root[2 Q[3, 1] Q[5, 3] Q[7, 2] + 2 Q[5, 3] Q[7, 2] #1 + Q[7, 2] #1^2 + #1^3 &, 2],
Root[2 Q[3, 1] Q[5, 3] Q[7, 2] + 2 Q[5, 3] Q[7, 2] #1 + Q[7, 2] #1^2 + #1^3 &, 3]}

Char Polyn=$z^3 + z^2$ Q[7, 2] + 2 z Q[5, 3] Q[7, 2] + 2 Q[3, 1] Q[5, 3] Q[7, 2]

1 connected components

Jacobian={{0, 0, Q[5, 3]}, {-Q[3, 1], -Q[7, 2], -Q[5, 3]}, {0, 2 Q[7, 2], 0}}

Stability conditions

1

Q[7, 2] > 0 && Q[5, 3] > 0 && 0 < Q[3, 1] < Q[7, 2]

2

Q[7, 2] > 0 && 0 < Q[3, 1] < Q[7, 2] && Q[5, 3] > 0

3

Q[5, 3] > 0 && Q[3, 1] > 0 && Q[7, 2] > Q[3, 1]

#52

Triplet: Q4x Q5z Q7y

Eigenvalues: {Root[-2 Q[4, 1] Q[5, 3] Q[7, 2] + 2 Q[5, 3] Q[7, 2] #1 + Q[7, 2] #1^2 + #1^3 &, 1],
Root[-2 Q[4, 1] Q[5, 3] Q[7, 2] + 2 Q[5, 3] Q[7, 2] #1 + Q[7, 2] #1^2 + #1^3 &, 2],
Root[-2 Q[4, 1] Q[5, 3] Q[7, 2] + 2 Q[5, 3] Q[7, 2] #1 + Q[7, 2] #1^2 + #1^3 &, 3]}

Char Polyn=$z^3 + z^2$ Q[7, 2] + 2 z Q[5, 3] Q[7, 2] - 2 Q[4, 1] Q[5, 3] Q[7, 2]

1 connected components

Jacobian={{0, 0, Q[5, 3]}, {Q[4, 1], -Q[7, 2], -Q[5, 3]}, {0, 2 Q[7, 2], 0}}

Stability conditions

1

Q[7, 2] > 0 && Q[5, 3] > 0 && -Q[7, 2] < Q[4, 1] < 0

2

Q[7, 2] > 0 && -Q[7, 2] < Q[4, 1] < 0 && Q[5, 3] > 0

3

Q[5, 3] > 0 && Q[4, 1] < 0 && Q[7, 2] > -Q[4, 1]

#53

Triplet: Q1x Q6z Q7y

Eigenvalues:
{Root[4 Q[1, 1] Q[6, 3] Q[7, 2] + Q[1, 1] Q[7, 2] #1 + (Q[1, 1] + Q[7, 2]) #1^2 + #1^3 &, 1],
Root[4 Q[1, 1] Q[6, 3] Q[7, 2] + Q[1, 1] Q[7, 2] #1 + (Q[1, 1] + Q[7, 2]) #1^2 + #1^3 &, 2],
Root[4 Q[1, 1] Q[6, 3] Q[7, 2] + Q[1, 1] Q[7, 2] #1 + (Q[1, 1] + Q[7, 2]) #1^2 + #1^3 &, 3]}

Char Polyn=$z^3 + z^2$ Q[1, 1] + z^2 Q[7, 2] + z Q[1, 1] Q[7, 2] + 4 Q[1, 1] Q[6, 3] Q[7, 2]

1 connected components

Jacobian={{-Q[1, 1], 0, -Q[6, 3]}, {2 Q[1, 1], -Q[7, 2], 0}, {0, 2 Q[7, 2], 0}}

Stability conditions

1

$Q[7, 2] > 0 \;\&\&\; \left(\left(0 < Q[6, 3] \le \frac{1}{4} Q[7, 2] \;\&\&\; Q[1, 1] > 0\right) \;||\; \left(Q[6, 3] > \frac{1}{4} Q[7, 2] \;\&\&\; Q[1, 1] > 4 Q[6, 3] - Q[7, 2]\right)\right)$

2

$Q[7, 2] > 0 \;\&\&\; Q[1, 1] > 0 \;\&\&\; 0 < Q[6, 3] < \frac{1}{4} (Q[1, 1] + Q[7, 2])$

3

$Q[6, 3] > 0 \;\&\&\; ((0 < Q[1, 1] \le 4 Q[6, 3] \;\&\&\; Q[7, 2] > -Q[1, 1] + 4 Q[6, 3]) \;||\; (Q[1, 1] > 4 Q[6, 3] \;\&\&\; Q[7, 2] > 0))$

#54

Triplet: Q5x Q6z Q7y

Eigenvalues:
$\{\mathrm{Root}[-2 Q[5, 1] Q[6, 3] Q[7, 2] - Q[5, 1] Q[7, 2] \#1 + (-Q[5, 1] + Q[7, 2]) \#1^2 + \#1^3 \&, 1],$
$\mathrm{Root}[-2 Q[5, 1] Q[6, 3] Q[7, 2] - Q[5, 1] Q[7, 2] \#1 + (-Q[5, 1] + Q[7, 2]) \#1^2 + \#1^3 \&, 2],$
$\mathrm{Root}[-2 Q[5, 1] Q[6, 3] Q[7, 2] - Q[5, 1] Q[7, 2] \#1 + (-Q[5, 1] + Q[7, 2]) \#1^2 + \#1^3 \&, 3]\}$

Char Polyn=$z^3 - z^2 Q[5, 1] + z^2 Q[7, 2] - z Q[5, 1] Q[7, 2] - 2 Q[5, 1] Q[6, 3] Q[7, 2]$

1 connected components

Jacobian={{Q[5, 1], 0, -Q[6, 3]}, {-Q[5, 1], -Q[7, 2], 0}, {0, 2 Q[7, 2], 0}}

Stability conditions

1

$Q[7, 2] > 0 \;\&\&\; \left(\left(0 < Q[6, 3] \le \frac{1}{2} Q[7, 2] \;\&\&\; Q[5, 1] < 0\right) \;||\; \left(Q[6, 3] > \frac{1}{2} Q[7, 2] \;\&\&\; Q[5, 1] < -2 Q[6, 3] + Q[7, 2]\right)\right)$

2

$Q[7, 2] > 0 \;\&\&\; Q[5, 1] < 0 \;\&\&\; 0 < Q[6, 3] < \frac{1}{2} (-Q[5, 1] + Q[7, 2])$

3

$Q[6, 3] > 0 \;\&\&\; ((Q[5, 1] \le -2 Q[6, 3] \;\&\&\; Q[7, 2] > 0) \;||\; (-2 Q[6, 3] < Q[5, 1] < 0 \;\&\&\; Q[7, 2] > Q[5, 1] + 2 Q[6, 3]))$

#55

Triplet: Q1z Q3x Q8y

Eigenvalues: $\{\mathrm{Root}[Q[1, 3] Q[3, 1] Q[8, 2] + 2 Q[1, 3] Q[8, 2] \#1 - Q[8, 2] \#1^2 + \#1^3 \&, 1],$
$\mathrm{Root}[Q[1, 3] Q[3, 1] Q[8, 2] + 2 Q[1, 3] Q[8, 2] \#1 - Q[8, 2] \#1^2 + \#1^3 \&, 2],$
$\mathrm{Root}[Q[1, 3] Q[3, 1] Q[8, 2] + 2 Q[1, 3] Q[8, 2] \#1 - Q[8, 2] \#1^2 + \#1^3 \&, 3]\}$

Char Polyn=$z^3 - z^2 Q[8, 2] + 2 z Q[1, 3] Q[8, 2] + Q[1, 3] Q[3, 1] Q[8, 2]$

1 connected components

Jacobian={{0, 0, -Q[1, 3]}, {-Q[3, 1], Q[8, 2], 2 Q[1, 3]}, {0, -Q[8, 2], 0}}

Stability conditions

1

Q[8, 2] < 0 && 0 < Q[3, 1] < -2 Q[8, 2] && Q[1, 3] < 0

2

Q[8, 2] < 0 && Q[1, 3] < 0 && 0 < Q[3, 1] < -2 Q[8, 2]

3

Q[3, 1] > 0 && Q[1, 3] < 0 && Q[8, 2] < $-\frac{1}{2}$ Q[3, 1]

♯56

Triplet: Q1z Q4x Q8y

Eigenvalues: {Root[-Q[1, 3] Q[4, 1] Q[8, 2] + 2 Q[1, 3] Q[8, 2] ♯1 - Q[8, 2] ♯1^2 + ♯1^3 &, 1],
Root[-Q[1, 3] Q[4, 1] Q[8, 2] + 2 Q[1, 3] Q[8, 2] ♯1 - Q[8, 2] ♯1^2 + ♯1^3 &, 2],
Root[-Q[1, 3] Q[4, 1] Q[8, 2] + 2 Q[1, 3] Q[8, 2] ♯1 - Q[8, 2] ♯1^2 + ♯1^3 &, 3]}

Char Polyn=z^3 - z^2 Q[8, 2] + 2 z Q[1, 3] Q[8, 2] - Q[1, 3] Q[4, 1] Q[8, 2]

1 connected components

Jacobian={{0, 0, -Q[1, 3]}, {Q[4, 1], Q[8, 2], 2 Q[1, 3]}, {0, -Q[8, 2], 0}}

Stability conditions

1

Q[8, 2] < 0 && 2 Q[8, 2] < Q[4, 1] < 0 && Q[1, 3] < 0

2

Q[8, 2] < 0 && Q[1, 3] < 0 && 2 Q[8, 2] < Q[4, 1] < 0

3

Q[4, 1] < 0 && Q[1, 3] < 0 && Q[8, 2] < $\frac{1}{2}$ Q[4, 1]

♯57

Triplet: Q1z Q5x Q8y

Eigenvalues: {Root[-Q[1, 3] Q[5, 1] Q[8, 2] +
(2 Q[1, 3] Q[8, 2] + Q[5, 1] Q[8, 2]) ♯1 + (-Q[5, 1] - Q[8, 2]) ♯1^2 + ♯1^3 &, 1],
Root[-Q[1, 3] Q[5, 1] Q[8, 2] + (2 Q[1, 3] Q[8, 2] + Q[5, 1] Q[8, 2]) ♯1 +
(-Q[5, 1] - Q[8, 2]) ♯1^2 + ♯1^3 &, 2], Root[-Q[1, 3] Q[5, 1] Q[8, 2] +
(2 Q[1, 3] Q[8, 2] + Q[5, 1] Q[8, 2]) ♯1 + (-Q[5, 1] - Q[8, 2]) ♯1^2 + ♯1^3 &, 3]}

Char Polyn=
z^3 - z^2 Q[5, 1] - z^2 Q[8, 2] + 2 z Q[1, 3] Q[8, 2] + z Q[5, 1] Q[8, 2] - Q[1, 3] Q[5, 1] Q[8, 2]

1 connected components

Jacobian={{Q[5, 1], 0, -Q[1, 3]}, {-Q[5, 1], Q[8, 2], 2 Q[1, 3]}, {0, -Q[8, 2], 0}}

Stability conditions

1

$(Q[8,2]<0 \&\& Q[5,1]<0 \&\& Q[1,3]<0) \,||\, \left(Q[8,2]>0 \&\& Q[5,1]<-2\,Q[8,2] \&\& Q[1,3]>\frac{-Q[5,1]^2-Q[5,1]\,Q[8,2]}{Q[5,1]+2\,Q[8,2]}\right)$

2

$(Q[8,2]<0 \&\& Q[1,3]<0 \&\& Q[5,1]<0) \,||\, \left(Q[8,2]>0 \&\& Q[1,3]>3\,Q[8,2]+2\sqrt{2}\sqrt{Q[8,2]^2} \&\& \frac{1}{2}(-Q[1,3]-Q[8,2])-\frac{1}{2}\sqrt{Q[1,3]^2-6\,Q[1,3]\,Q[8,2]+Q[8,2]^2} < Q[5,1] < \frac{1}{2}(-Q[1,3]-Q[8,2])+\frac{1}{2}\sqrt{Q[1,3]^2-6\,Q[1,3]\,Q[8,2]+Q[8,2]^2}\right)$

3

$Q[5,1]<0 \&\& \left((Q[1,3]<0 \&\& Q[8,2]<0) \,||\, \left(Q[1,3]>-Q[5,1] \&\& 0<Q[8,2]<\frac{-Q[1,3]\,Q[5,1]-Q[5,1]^2}{2\,Q[1,3]+Q[5,1]}\right)\right)$

#58

Triplet: Q2z Q5x Q8y

Eigenvalues:
$\{\text{Root}[-Q[2,3]\,Q[5,1]\,Q[8,2]+Q[5,1]\,Q[8,2]\,\#1+(-Q[5,1]-Q[8,2])\,\#1^2+\#1^3\,\&,1],$
$\text{Root}[-Q[2,3]\,Q[5,1]\,Q[8,2]+Q[5,1]\,Q[8,2]\,\#1+(-Q[5,1]-Q[8,2])\,\#1^2+\#1^3\,\&,2],$
$\text{Root}[-Q[2,3]\,Q[5,1]\,Q[8,2]+Q[5,1]\,Q[8,2]\,\#1+(-Q[5,1]-Q[8,2])\,\#1^2+\#1^3\,\&,3]\}$

Char Polyn=$z^3-z^2\,Q[5,1]-z^2\,Q[8,2]+z\,Q[5,1]\,Q[8,2]-Q[2,3]\,Q[5,1]\,Q[8,2]$

1 connected components

Jacobian=$\{\{Q[5,1],0,Q[2,3]\},\{-Q[5,1],Q[8,2],0\},\{0,-Q[8,2],0\}\}$

Stability conditions

1

$Q[8,2]<0 \&\& Q[5,1]<0 \&\& Q[5,1]+Q[8,2]<Q[2,3]<0$

2

$Q[8,2]<0 \&\& ((Q[2,3]\le Q[8,2] \&\& Q[5,1]<Q[2,3]-Q[8,2]) \,||\, (Q[8,2]<Q[2,3]<0 \&\& Q[5,1]<0))$

3

$Q[5,1]<0 \&\& ((Q[2,3]\le Q[5,1] \&\& Q[8,2]<Q[2,3]-Q[5,1]) \,||\, (Q[5,1]<Q[2,3]<0 \&\& Q[8,2]<0))$

#59

Triplet: Q1z Q7x Q8y

Eigenvalues: $\{\text{Root}[-Q[1,3]\,Q[7,1]\,Q[8,2]+(2\,Q[1,3]\,Q[7,1]+2\,Q[1,3]\,Q[8,2])\,\#1-Q[8,2]\,\#1^2+\#1^3\,\&,1],$
$\text{Root}[-Q[1,3]\,Q[7,1]\,Q[8,2]+(2\,Q[1,3]\,Q[7,1]+2\,Q[1,3]\,Q[8,2])\,\#1-Q[8,2]\,\#1^2+\#1^3\,\&,2],$
$\text{Root}[-Q[1,3]\,Q[7,1]\,Q[8,2]+(2\,Q[1,3]\,Q[7,1]+2\,Q[1,3]\,Q[8,2])\,\#1-Q[8,2]\,\#1^2+\#1^3\,\&,3]\}$

Char Polyn=$z^3 + 2\,z\,Q[1,3]\,Q[7,1] - z^2\,Q[8,2] + 2\,z\,Q[1,3]\,Q[8,2] - Q[1,3]\,Q[7,1]\,Q[8,2]$

1 connected components

Jacobian={{0, 0, -Q[1, 3]}, {-Q[7, 1], Q[8, 2], 2 Q[1, 3]}, {2 Q[7, 1], -Q[8, 2], 0}}

Stability conditions

1

Q[8, 2] < 0 && ((Q[7, 1] < 0 && Q[1, 3] < 0) || (Q[7, 1] > -2 Q[8, 2] && Q[1, 3] > 0))

2

Q[8, 2] < 0 && ((Q[1, 3] < 0 && Q[7, 1] < 0) || (Q[1, 3] > 0 && Q[7, 1] > -2 Q[8, 2]))

3

$(Q[7,1] < 0\ \&\&\ Q[1,3] < 0\ \&\&\ Q[8,2] < 0)\ ||\ \left(Q[7,1] > 0\ \&\&\ Q[1,3] > 0\ \&\&\ -\frac{1}{2}\,Q[7,1] < Q[8,2] < 0\right)$

♯60

Triplet: Q2z Q7x Q8y

Eigenvalues: {Root[Q[2, 3] Q[7, 1] Q[8, 2] - 2 Q[2, 3] Q[7, 1] ♯1 - Q[8, 2] ♯1^2 + ♯1^3 &, 1],
Root[Q[2, 3] Q[7, 1] Q[8, 2] - 2 Q[2, 3] Q[7, 1] ♯1 - Q[8, 2] ♯1^2 + ♯1^3 &, 2],
Root[Q[2, 3] Q[7, 1] Q[8, 2] - 2 Q[2, 3] Q[7, 1] ♯1 - Q[8, 2] ♯1^2 + ♯1^3 &, 3]}

Char Polyn=$z^3 - 2\,z\,Q[2,3]\,Q[7,1] - z^2\,Q[8,2] + Q[2,3]\,Q[7,1]\,Q[8,2]$

1 connected components

Jacobian={{0, 0, Q[2, 3]}, {-Q[7, 1], Q[8, 2], 0}, {2 Q[7, 1], -Q[8, 2], 0}}

Stability conditions

1

Q[8, 2] < 0 && ((Q[7, 1] < 0 && Q[2, 3] > 0) || (Q[7, 1] > 0 && Q[2, 3] < 0))

2

Q[8, 2] < 0 && ((Q[2, 3] < 0 && Q[7, 1] > 0) || (Q[2, 3] > 0 && Q[7, 1] < 0))

3

(Q[7, 1] < 0 && Q[2, 3] > 0 && Q[8, 2] < 0) || (Q[7, 1] > 0 && Q[2, 3] < 0 && Q[8, 2] < 0)

♯61

Triplet: Q5z Q7x Q8y

Eigenvalues:
{Root[Q[5, 3] Q[7, 1] Q[8, 2] + (-2 Q[5, 3] Q[7, 1] - Q[5, 3] Q[8, 2]) ♯1 - Q[8, 2] ♯1^2 + ♯1^3 &, 1],
Root[Q[5, 3] Q[7, 1] Q[8, 2] + (-2 Q[5, 3] Q[7, 1] - Q[5, 3] Q[8, 2]) ♯1 - Q[8, 2] ♯1^2 + ♯1^3 &, 2],
Root[Q[5, 3] Q[7, 1] Q[8, 2] + (-2 Q[5, 3] Q[7, 1] - Q[5, 3] Q[8, 2]) ♯1 - Q[8, 2] ♯1^2 + ♯1^3 &, 3]}

Char Polyn=$z^3 - 2\,z\,Q[5,3]\,Q[7,1] - z^2\,Q[8,2] - z\,Q[5,3]\,Q[8,2] + Q[5,3]\,Q[7,1]\,Q[8,2]$

1 connected components

Jacobian={{0, 0, Q[5, 3]}, {-Q[7, 1], Q[8, 2], -Q[5, 3]}, {2 Q[7, 1], -Q[8, 2], 0}}

Stability conditions

1

Q[8, 2] < 0 && ((Q[7, 1] < 0 && Q[5, 3] > 0) || (Q[7, 1] > -Q[8, 2] && Q[5, 3] < 0))

2

Q[8, 2] < 0 && ((Q[5, 3] < 0 && Q[7, 1] > -Q[8, 2]) || (Q[5, 3] > 0 && Q[7, 1] < 0))

3

(Q[7, 1] < 0 && Q[5, 3] > 0 && Q[8, 2] < 0) || (Q[7, 1] > 0 && Q[5, 3] < 0 && -Q[7, 1] < Q[8, 2] < 0)

#62

Triplet: Q6z Q7x Q8y

Eigenvalues: {Root[-Q[6, 3] Q[7, 1] Q[8, 2] + 2 Q[6, 3] Q[7, 1] #1 - Q[8, 2] #1^2 + #1^3 &, 1],
Root[-Q[6, 3] Q[7, 1] Q[8, 2] + 2 Q[6, 3] Q[7, 1] #1 - Q[8, 2] #1^2 + #1^3 &, 2],
Root[-Q[6, 3] Q[7, 1] Q[8, 2] + 2 Q[6, 3] Q[7, 1] #1 - Q[8, 2] #1^2 + #1^3 &, 3]}

Char Polyn=z^3 + 2 z Q[6, 3] Q[7, 1] - z^2 Q[8, 2] - Q[6, 3] Q[7, 1] Q[8, 2]

1 connected components

Jacobian={{0, 0, -Q[6, 3]}, {-Q[7, 1], Q[8, 2], 0}, {2 Q[7, 1], -Q[8, 2], 0}}

Stability conditions

1

Q[8, 2] < 0 && ((Q[7, 1] < 0 && Q[6, 3] < 0) || (Q[7, 1] > 0 && Q[6, 3] > 0))

2

Q[8, 2] < 0 && ((Q[6, 3] < 0 && Q[7, 1] < 0) || (Q[6, 3] > 0 && Q[7, 1] > 0))

3

(Q[7, 1] < 0 && Q[6, 3] < 0 && Q[8, 2] < 0) || (Q[7, 1] > 0 && Q[6, 3] > 0 && Q[8, 2] < 0)

#63

Triplet: Q1x Q2z Q8y

Eigenvalues:
{Root[2 Q[1, 1] Q[2, 3] Q[8, 2] - Q[1, 1] Q[8, 2] #1 + (Q[1, 1] - Q[8, 2]) #1^2 + #1^3 &, 1],
Root[2 Q[1, 1] Q[2, 3] Q[8, 2] - Q[1, 1] Q[8, 2] #1 + (Q[1, 1] - Q[8, 2]) #1^2 + #1^3 &, 2],
Root[2 Q[1, 1] Q[2, 3] Q[8, 2] - Q[1, 1] Q[8, 2] #1 + (Q[1, 1] - Q[8, 2]) #1^2 + #1^3 &, 3]}

Char Polyn=z^3 + z^2 Q[1, 1] - z^2 Q[8, 2] - z Q[1, 1] Q[8, 2] + 2 Q[1, 1] Q[2, 3] Q[8, 2]

1 connected components

Jacobian={{-Q[1, 1], 0, Q[2, 3]}, {2 Q[1, 1], Q[8, 2], 0}, {0, -Q[8, 2], 0}}

Stability conditions

1

$$Q[8,2] < 0 \;\&\&\; \left(\left(Q[2,3] \le \frac{1}{2} Q[8,2] \;\&\&\; Q[1,1] > -2\,Q[2,3] + Q[8,2]\right) \;||\; \left(\frac{1}{2} Q[8,2] < Q[2,3] < 0 \;\&\&\; Q[1,1] > 0\right)\right)$$

2

$Q[8,2] < 0 \,\&\&\, Q[1,1] > 0 \,\&\&\, \frac{1}{2}(-Q[1,1] + Q[8,2]) < Q[2,3] < 0$

3

$Q[2,3] < 0 \,\&\&\, ((0 < Q[1,1] \leq -2\,Q[2,3] \,\&\&\, Q[8,2] < Q[1,1] + 2\,Q[2,3]) \,||\, (Q[1,1] > -2\,Q[2,3] \,\&\&\, Q[8,2] < 0))$

♯64

Triplet: Q1x Q5z Q8y

Eigenvalues:
$\{\text{Root}[Q[1,1]\,Q[5,3]\,Q[8,2] + (-Q[1,1]\,Q[8,2] - Q[5,3]\,Q[8,2])\,\sharp1 + (Q[1,1] - Q[8,2])\,\sharp1^2 + \sharp1^3\,\&, 1], \text{Root}[Q[1,1]\,Q[5,3]\,Q[8,2] + (-Q[1,1]\,Q[8,2] - Q[5,3]\,Q[8,2])\,\sharp1 + (Q[1,1] - Q[8,2])\,\sharp1^2 + \sharp1^3\,\&, 2], \text{Root}[Q[1,1]\,Q[5,3]\,Q[8,2] + (-Q[1,1]\,Q[8,2] - Q[5,3]\,Q[8,2])\,\sharp1 + (Q[1,1] - Q[8,2])\,\sharp1^2 + \sharp1^3\,\&, 3]\}$

Char Polyn=
$z^3 + z^2\,Q[1,1] - z^2\,Q[8,2] - z\,Q[1,1]\,Q[8,2] - z\,Q[5,3]\,Q[8,2] + Q[1,1]\,Q[5,3]\,Q[8,2]$

1 connected components

Jacobian=$\{\{-Q[1,1], 0, Q[5,3]\}, \{2\,Q[1,1], Q[8,2], -Q[5,3]\}, \{0, -Q[8,2], 0\}\}$

Stability conditions

1

$Q[8,2] < 0 \,\&\&\, \left(\left(Q[5,3] < 0 \,\&\&\, Q[1,1] > \frac{1}{2}(-2\,Q[5,3] + Q[8,2]) + \frac{1}{2}\sqrt{4\,Q[5,3]^2 + Q[8,2]^2}\right) \,||\, \left(Q[5,3] > 0 \,\&\&\, \frac{1}{2}(-2\,Q[5,3] + Q[8,2]) + \frac{1}{2}\sqrt{4\,Q[5,3]^2 + Q[8,2]^2} < Q[1,1] < 0\right)\right)$

2

$Q[8,2] < 0 \,\&\&\, \left(\left(\frac{1}{2}Q[8,2] < Q[1,1] < 0 \,\&\&\, Q[5,3] > \frac{-Q[1,1]^2 + Q[1,1]\,Q[8,2]}{2\,Q[1,1] - Q[8,2]}\right) \,||\, \left(Q[1,1] > 0 \,\&\&\, \frac{-Q[1,1]^2 + Q[1,1]\,Q[8,2]}{2\,Q[1,1] - Q[8,2]} < Q[5,3] < 0\right)\right)$

3

$\left(Q[5,3] < 0 \,\&\&\, \left(\left(-Q[5,3] < Q[1,1] \leq -2\,Q[5,3] \,\&\&\, Q[8,2] < \frac{Q[1,1]^2 + 2\,Q[1,1]\,Q[5,3]}{Q[1,1] + Q[5,3]}\right) \,||\, (Q[1,1] > -2\,Q[5,3] \,\&\&\, Q[8,2] < 0)\right)\right) \,||\, \left(Q[5,3] > 0 \,\&\&\, -Q[5,3] < Q[1,1] < 0 \,\&\&\, Q[8,2] < \frac{Q[1,1]^2 + 2\,Q[1,1]\,Q[5,3]}{Q[1,1] + Q[5,3]}\right)$

♯65

Triplet: Q3x Q5z Q8y

Eigenvalues: $\{\text{Root}[-Q[3,1]\,Q[5,3]\,Q[8,2] - Q[5,3]\,Q[8,2]\,\sharp1 - Q[8,2]\,\sharp1^2 + \sharp1^3\,\&, 1], \text{Root}[-Q[3,1]\,Q[5,3]\,Q[8,2] - Q[5,3]\,Q[8,2]\,\sharp1 - Q[8,2]\,\sharp1^2 + \sharp1^3\,\&, 2], \text{Root}[-Q[3,1]\,Q[5,3]\,Q[8,2] - Q[5,3]\,Q[8,2]\,\sharp1 - Q[8,2]\,\sharp1^2 + \sharp1^3\,\&, 3]\}$

Char Polyn=$z^3 - z^2\,Q[8,2] - z\,Q[5,3]\,Q[8,2] - Q[3,1]\,Q[5,3]\,Q[8,2]$

1 connected components

Jacobian={{0, 0, Q[5, 3]}, {-Q[3, 1], Q[8, 2], -Q[5, 3]}, {0, -Q[8, 2], 0}}

Stability conditions

1

Q[8, 2] < 0 && Q[5, 3] > 0 && 0 < Q[3, 1] < -Q[8, 2]

2

Q[8, 2] < 0 && 0 < Q[3, 1] < -Q[8, 2] && Q[5, 3] > 0

3

Q[5, 3] > 0 && Q[3, 1] > 0 && Q[8, 2] < -Q[3, 1]

#66

Triplet: Q4x Q5z Q8y

Eigenvalues: {Root[Q[4, 1] Q[5, 3] Q[8, 2] - Q[5, 3] Q[8, 2] #1 - Q[8, 2] #1^2 + #1^3 &, 1],
Root[Q[4, 1] Q[5, 3] Q[8, 2] - Q[5, 3] Q[8, 2] #1 - Q[8, 2] #1^2 + #1^3 &, 2],
Root[Q[4, 1] Q[5, 3] Q[8, 2] - Q[5, 3] Q[8, 2] #1 - Q[8, 2] #1^2 + #1^3 &, 3]}

Char Polyn=$z^3 - z^2$ Q[8, 2] - z Q[5, 3] Q[8, 2] + Q[4, 1] Q[5, 3] Q[8, 2]

1 connected components

Jacobian={{0, 0, Q[5, 3]}, {Q[4, 1], Q[8, 2], -Q[5, 3]}, {0, -Q[8, 2], 0}}

Stability conditions

1

Q[8, 2] < 0 && Q[5, 3] > 0 && Q[8, 2] < Q[4, 1] < 0

2

Q[8, 2] < 0 && Q[8, 2] < Q[4, 1] < 0 && Q[5, 3] > 0

3

Q[5, 3] > 0 && Q[4, 1] < 0 && Q[8, 2] < Q[4, 1]

#67

Triplet: Q1x Q6z Q8y

Eigenvalues:
{Root[-2 Q[1, 1] Q[6, 3] Q[8, 2] - Q[1, 1] Q[8, 2] #1 + (Q[1, 1] - Q[8, 2]) #1^2 + #1^3 &, 1],
Root[-2 Q[1, 1] Q[6, 3] Q[8, 2] - Q[1, 1] Q[8, 2] #1 + (Q[1, 1] - Q[8, 2]) #1^2 + #1^3 &, 2],
Root[-2 Q[1, 1] Q[6, 3] Q[8, 2] - Q[1, 1] Q[8, 2] #1 + (Q[1, 1] - Q[8, 2]) #1^2 + #1^3 &, 3]}

Char Polyn=$z^3 + z^2$ Q[1, 1] - z^2 Q[8, 2] - z Q[1, 1] Q[8, 2] - 2 Q[1, 1] Q[6, 3] Q[8, 2]

1 connected components

Jacobian={{-Q[1, 1], 0, -Q[6, 3]}, {2 Q[1, 1], Q[8, 2], 0}, {0, -Q[8, 2], 0}}

Stability conditions

1

$Q[8,2] < 0 \;\&\&\; \left(\left(0 < Q[6,3] \le -\frac{1}{2} Q[8,2] \;\&\&\; Q[1,1] > 0\right) \;||\; \left(Q[6,3] > -\frac{1}{2} Q[8,2] \;\&\&\; Q[1,1] > 2\, Q[6,3] + Q[8,2]\right)\right)$

2

$Q[8,2] < 0 \;\&\&\; Q[1,1] > 0 \;\&\&\; 0 < Q[6,3] < \frac{1}{2} (Q[1,1] - Q[8,2])$

3

$Q[6,3] > 0 \;\&\&\; ((0 < Q[1,1] \le 2\, Q[6,3] \;\&\&\; Q[8,2] < Q[1,1] - 2\, Q[6,3]) \;||\; (Q[1,1] > 2\, Q[6,3] \;\&\&\; Q[8,2] < 0))$

#68

Triplet: Q5x Q6z Q8y

Eigenvalues:
$\{\mathrm{Root}[Q[5,1]\, Q[6,3]\, Q[8,2] + Q[5,1]\, Q[8,2]\, \#1 + (-Q[5,1] - Q[8,2])\, \#1^2 + \#1^3 \;\&, 1],$
$\mathrm{Root}[Q[5,1]\, Q[6,3]\, Q[8,2] + Q[5,1]\, Q[8,2]\, \#1 + (-Q[5,1] - Q[8,2])\, \#1^2 + \#1^3 \;\&, 2],$
$\mathrm{Root}[Q[5,1]\, Q[6,3]\, Q[8,2] + Q[5,1]\, Q[8,2]\, \#1 + (-Q[5,1] - Q[8,2])\, \#1^2 + \#1^3 \;\&, 3]\}$

Char Polyn=$z^3 - z^2 Q[5,1] - z^2 Q[8,2] + z\, Q[5,1]\, Q[8,2] + Q[5,1]\, Q[6,3]\, Q[8,2]$

1 connected components

Jacobian=$\{\{Q[5,1], 0, -Q[6,3]\}, \{-Q[5,1], Q[8,2], 0\}, \{0, -Q[8,2], 0\}\}$

Stability conditions

1

$Q[8,2] < 0 \;\&\&\; ((0 < Q[6,3] \le -Q[8,2] \;\&\&\; Q[5,1] < 0) \;||\; (Q[6,3] > -Q[8,2] \;\&\&\; Q[5,1] < -Q[6,3] - Q[8,2]))$

2

$Q[8,2] < 0 \;\&\&\; Q[5,1] < 0 \;\&\&\; 0 < Q[6,3] < -Q[5,1] - Q[8,2]$

3

$Q[6,3] > 0 \;\&\&\; ((Q[5,1] \le -Q[6,3] \;\&\&\; Q[8,2] < 0) \;||\; (-Q[6,3] < Q[5,1] < 0 \;\&\&\; Q[8,2] < -Q[5,1] - Q[6,3]))$

#69

Triplet: Q1z Q5x Q9y

Eigenvalues: $\{\mathrm{Root}[-Q[1,3]\, Q[5,1]\, Q[9,2] + 2\, Q[1,3]\, Q[9,2]\, \#1 - Q[5,1]\, \#1^2 + \#1^3 \;\&, 1],$
$\mathrm{Root}[-Q[1,3]\, Q[5,1]\, Q[9,2] + 2\, Q[1,3]\, Q[9,2]\, \#1 - Q[5,1]\, \#1^2 + \#1^3 \;\&, 2],$
$\mathrm{Root}[-Q[1,3]\, Q[5,1]\, Q[9,2] + 2\, Q[1,3]\, Q[9,2]\, \#1 - Q[5,1]\, \#1^2 + \#1^3 \;\&, 3]\}$

Char Polyn=$z^3 - z^2 Q[5,1] + 2\, z\, Q[1,3]\, Q[9,2] - Q[1,3]\, Q[5,1]\, Q[9,2]$

1 connected components

Jacobian=$\{\{Q[5,1], 0, -Q[1,3]\}, \{-Q[5,1], 0, 2\, Q[1,3]\}, \{0, -Q[9,2], 0\}\}$

Stability conditions

1

$(Q[9,2] < 0 \;\&\&\; Q[5,1] < 0 \;\&\&\; Q[1,3] < 0) \;||\; (Q[9,2] > 0 \;\&\&\; Q[5,1] < 0 \;\&\&\; Q[1,3] > 0)$

2

(Q[9, 2] < 0 && Q[1, 3] < 0 && Q[5, 1] < 0) || (Q[9, 2] > 0 && Q[1, 3] > 0 && Q[5, 1] < 0)

3

Q[5, 1] < 0 && ((Q[1, 3] < 0 && Q[9, 2] < 0) || (Q[1, 3] > 0 && Q[9, 2] > 0))

#70

Triplet: Q1z Q5x Q10y

Eigenvalues: $\{\text{Root}[Q[1,3]\,Q[5,1]\,Q[10,2] - 2\,Q[1,3]\,Q[10,2]\,\#1 - Q[5,1]\,\#1^2 + \#1^3\,\&, 1],$
$\text{Root}[Q[1,3]\,Q[5,1]\,Q[10,2] - 2\,Q[1,3]\,Q[10,2]\,\#1 - Q[5,1]\,\#1^2 + \#1^3\,\&, 2],$
$\text{Root}[Q[1,3]\,Q[5,1]\,Q[10,2] - 2\,Q[1,3]\,Q[10,2]\,\#1 - Q[5,1]\,\#1^2 + \#1^3\,\&, 3]\}$

Char Polyn=$z^3 - z^2\,Q[5,1] - 2\,z\,Q[1,3]\,Q[10,2] + Q[1,3]\,Q[5,1]\,Q[10,2]$

1 connected components

Jacobian={{Q[5, 1], 0, -Q[1, 3]}, {-Q[5, 1], 0, 2 Q[1, 3]}, {0, Q[10, 2], 0}}

Stability conditions

1

(Q[10, 2] < 0 && Q[5, 1] < 0 && Q[1, 3] > 0) || (Q[10, 2] > 0 && Q[5, 1] < 0 && Q[1, 3] < 0)

2

(Q[10, 2] < 0 && Q[1, 3] > 0 && Q[5, 1] < 0) || (Q[10, 2] > 0 && Q[1, 3] < 0 && Q[5, 1] < 0)

3

Q[5, 1] < 0 && ((Q[1, 3] < 0 && Q[10, 2] > 0) || (Q[1, 3] > 0 && Q[10, 2] < 0))

#71

Triplet: Q1y Q7x Q8z

Eigenvalues: $\{\text{Root}[Q[1,2]\,Q[7,1]\,Q[8,3] +$
$(-Q[1,2]\,Q[7,1] - 2\,Q[1,2]\,Q[8,3])\,\#1 + (-2\,Q[1,2] + Q[8,3])\,\#1^2 + \#1^3\,\&, 1],$
$\text{Root}[Q[1,2]\,Q[7,1]\,Q[8,3] + (-Q[1,2]\,Q[7,1] - 2\,Q[1,2]\,Q[8,3])\,\#1 +$
$(-2\,Q[1,2] + Q[8,3])\,\#1^2 + \#1^3\,\&, 2], \text{Root}[Q[1,2]\,Q[7,1]\,Q[8,3] +$
$(-Q[1,2]\,Q[7,1] - 2\,Q[1,2]\,Q[8,3])\,\#1 + (-2\,Q[1,2] + Q[8,3])\,\#1^2 + \#1^3\,\&, 3]\}$

Char Polyn=
$z^3 - 2\,z^2\,Q[1,2] - z\,Q[1,2]\,Q[7,1] + z^2\,Q[8,3] - 2\,z\,Q[1,2]\,Q[8,3] + Q[1,2]\,Q[7,1]\,Q[8,3]$

1 connected components

Jacobian={{0, -Q[1, 2], 0}, {-Q[7, 1], 2 Q[1, 2], Q[8, 3]}, {2 Q[7, 1], 0, -Q[8, 3]}}

Stability conditions

1

$$\left(Q[8,3] < 0 \,\&\&\, Q[7,1] > -2\,Q[8,3] \,\&\&\, Q[1,2] < \frac{Q[7,1]\,Q[8,3] + Q[8,3]^2}{Q[7,1] + 2\,Q[8,3]}\right) \,||$$
$$\left(Q[8,3] > 0 \,\&\&\, \left(\left(-2\,Q[8,3] < Q[7,1] \le -Q[8,3] \,\&\&\, Q[1,2] < \frac{Q[7,1]\,Q[8,3] + Q[8,3]^2}{Q[7,1] + 2\,Q[8,3]}\right) \,||\right.\right.$$
$$\left.\left.(-Q[8,3] < Q[7,1] < 0 \,\&\&\, Q[1,2] < 0)\right)\right)$$

2

$\left(Q[8,3] < 0 \&\& Q[1,2] < Q[8,3] \&\& Q[7,1] > \frac{-2 Q[1,2] Q[8,3] + Q[8,3]^2}{Q[1,2] - Q[8,3]}\right) \,||$
$\left(Q[8,3] > 0 \&\& Q[1,2] < 0 \&\& \frac{-2 Q[1,2] Q[8,3] + Q[8,3]^2}{Q[1,2] - Q[8,3]} < Q[7,1] < 0\right)$

3

$\left(Q[7,1] < 0 \&\& Q[1,2] < 0 \&\& Q[8,3] > \frac{1}{2} (2 Q[1,2] - Q[7,1]) + \frac{1}{2} \sqrt{4 Q[1,2]^2 + Q[7,1]^2}\right) \,||$
$\left(Q[7,1] > 0 \&\& Q[1,2] < 0 \&\& \frac{1}{2} (2 Q[1,2] - Q[7,1]) + \frac{1}{2} \sqrt{4 Q[1,2]^2 + Q[7,1]^2} < Q[8,3] < 0\right)$

#72

Triplet: Q5y Q7x Q8z

Eigenvalues:
{Root[-Q[5, 2] Q[7, 1] Q[8, 3] + (Q[5, 2] Q[7, 1] + Q[5, 2] Q[8, 3]) #1 + (Q[5, 2] + Q[8, 3]) #1^2 + #1^3 &, 1], Root[-Q[5, 2] Q[7, 1] Q[8, 3] + (Q[5, 2] Q[7, 1] + Q[5, 2] Q[8, 3]) #1 + (Q[5, 2] + Q[8, 3]) #1^2 + #1^3 &, 2], Root[-Q[5, 2] Q[7, 1] Q[8, 3] + (Q[5, 2] Q[7, 1] + Q[5, 2] Q[8, 3]) #1 + (Q[5, 2] + Q[8, 3]) #1^2 + #1^3 &, 3]}

Char Polyn=
$z^3 + z^2 Q[5,2] + z Q[5,2] Q[7,1] + z^2 Q[8,3] + z Q[5,2] Q[8,3] - Q[5,2] Q[7,1] Q[8,3]$

1 connected components

Jacobian={{0, Q[5, 2], 0}, {-Q[7, 1], -Q[5, 2], Q[8, 3]}, {2 Q[7, 1], 0, -Q[8, 3]}}

Stability conditions

1

$\left(Q[8,3] < 0 \&\& Q[7,1] > -Q[8,3] \&\& Q[5,2] > \frac{-2 Q[7,1] Q[8,3] - Q[8,3]^2}{Q[7,1] + Q[8,3]}\right) \,||$
$\left(Q[8,3] > 0 \&\& \left(\left(-Q[8,3] < Q[7,1] \leq -\frac{1}{2} Q[8,3] \&\& Q[5,2] > \frac{-2 Q[7,1] Q[8,3] - Q[8,3]^2}{Q[7,1] + Q[8,3]}\right) \,|| \left(-\frac{1}{2} Q[8,3] < Q[7,1] < 0 \&\& Q[5,2] > 0\right)\right)\right)$

2

$\left(Q[8,3] < 0 \&\& Q[5,2] > -2 Q[8,3] \&\& Q[7,1] > \frac{-Q[5,2] Q[8,3] - Q[8,3]^2}{Q[5,2] + 2 Q[8,3]}\right) \,||$
$\left(Q[8,3] > 0 \&\& Q[5,2] > 0 \&\& \frac{-Q[5,2] Q[8,3] - Q[8,3]^2}{Q[5,2] + 2 Q[8,3]} < Q[7,1] < 0\right)$

3

$\left(Q[7,1] < 0 \&\& Q[5,2] > 0 \&\& Q[8,3] > \frac{1}{2} (-Q[5,2] - 2 Q[7,1]) + \frac{1}{2} \sqrt{Q[5,2]^2 + 4 Q[7,1]^2}\right) \,||$
$\left(Q[7,1] > 0 \&\& Q[5,2] > 0 \&\& \frac{1}{2} (-Q[5,2] - 2 Q[7,1]) + \frac{1}{2} \sqrt{Q[5,2]^2 + 4 Q[7,1]^2} < Q[8,3] < 0\right)$