```
In[1]:= (* -------------- Majority Rule Group Size G odd -------------- *)
(* Parameters setting and initial conditions *)
G = 3;
NS = G - 1;
ρA = 1;
α = (ρA * g) ^ - 1;
β = (ρB * g) ^ - 1;

In[6]:= (* pXY:probability that an agent X switch opinion
   towards Y as a result of the Majority Rule group size G=NS+1 *)
pA := dA / (dA + dB);
pB := dB / (dA + dB);
(* pAA :=Sum[NS!/(i!*(NS-i)!)*pA^i*pB^(NS-i),{i,Floor[NS/2],NS}];*)
pBA := Sum[NS! / (i! * (NS - i)!) * pA^(NS-i) * pB^i, {i, 0, Floor[NS/2] - 1}];
pAB := Sum[NS! / (i! * (NS - i)!) * pA^i * pB^(NS-i), {i, 0, Floor[NS/2] - 1}];
pAA := 1 - pAB;
pBB := 1 - pBA;

In[12]:= (* Definition of the Steady State System *)
steadySystem = {
   σ * eA - α * dA == 0,
   σ * eB - β * dB == 0,
   pAA * α * dA + pBA * β * dB - σ * eA == 0,
   pAB * α * dA + pBB * β * dB - σ * eB == 0};
conditions = {
   dA + dB + eA + eB - 1 == 0,
   dA ≥ 0,
   dB ≥ 0,
   eA ≥ 0,
   eB ≥ 0,
   σ > 0,
   g > 0,
   1 > ρB > 0};
variables = {dA, dB, eA, eB};

In[15]:= (* Compute steady states *)
rule = ConditionalExpression[a_, b__] → a;
equilibria =
  Simplify[Solve[Rationalize[Join[steadySystem, conditions]], variables] /. rule];
Print["There are ", Length[equilibria], " steady states"];
Print[equilibria];
```

There are 3 steady states

$$\left\{\left\{d_A \to \frac{g\,\sigma}{1+g\,\sigma},\ d_B \to 0,\ e_A \to \frac{1}{1+g\,\sigma},\ e_B \to 0\right\},\right.$$
$$\left\{d_A \to 0,\ d_B \to \frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B},\ e_A \to 0,\ e_B \to \frac{1}{1+g\,\sigma\,\rho_B}\right\},\ \left\{d_A \to \frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+(1+g\,\sigma)\,\rho_B^2},\right.$$
$$\left.\left. d_B \to \frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+(1+g\,\sigma)\,\rho_B^2},\ e_A \to \frac{\rho_B^2}{1+g\,\sigma\,\rho_B+(1+g\,\sigma)\,\rho_B^2},\ e_B \to \frac{1}{1+g\,\sigma\,\rho_B+(1+g\,\sigma)\,\rho_B^2}\right\}\right\}$$

In[19]:=
```
(* Compute eigenvalues *)
steadySystemLHS = steadySystem /. Equal[x_, y_] → x;
jac = Outer[D, steadySystemLHS, variables];
eigenValues = Map[Eigenvalues[jac /. #] &, equilibria];
```

In[24]:=
```
(* Stability analysis *)
For[eq = 1, eq < Length[eigenValues] + 1, eq++,
  ev = eigenValues[[eq]];
  Print["Equilibrium[", eq, "]:", equilibria[[eq]]];
  Print["Eigenvalues:", ev];
  For[evIt = 2, evIt < Length[ev] + 1, evIt++,
   eval = Rationalize[ev[[evIt]]];
   conditions = {FullSimplify[eval] < 0, σ > 0, g > 0, 1 > ρB > 0};
   variables = {σ, g, ρB};
   red = Reduce[conditions, variables];
   Print["Condition satisfied(ev[", evIt, "]<0): ", red];];
  Print["--------------------------------------"];
 ];
```

Equilibrium[1]: $\left\{d_A \to \frac{g\,\sigma}{1+g\,\sigma},\ d_B \to 0,\ e_A \to \frac{1}{1+g\,\sigma},\ e_B \to 0\right\}$

Eigenvalues: $\left\{-\frac{1}{g\,\rho_B},\ 0,\ -\sigma,\ \frac{-\rho_B - g\,\sigma\,\rho_B}{g\,\rho_B}\right\}$

Condition satisfied(ev[2]<0): False

Condition satisfied(ev[3]<0): $\sigma > 0\ \&\&\ g > 0\ \&\&\ 0 < \rho_B < 1$

Condition satisfied(ev[4]<0): $\sigma > 0\ \&\&\ g > 0\ \&\&\ 0 < \rho_B < 1$

Equilibrium[2]: $\left\{d_A \to 0,\ d_B \to \frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B},\ e_A \to 0,\ e_B \to \frac{1}{1+g\,\sigma\,\rho_B}\right\}$

Eigenvalues: $\left\{0,\ -\frac{1}{g},\ -\sigma,\ \frac{-1 - g\,\sigma\,\rho_B}{g\,\rho_B}\right\}$

Condition satisfied(ev[2]<0): $\sigma > 0\ \&\&\ g > 0\ \&\&\ 0 < \rho_B < 1$

Condition satisfied(ev[3]<0): $\sigma > 0\ \&\&\ g > 0\ \&\&\ 0 < \rho_B < 1$

Condition satisfied(ev[4]<0): $\sigma > 0\ \&\&\ g > 0\ \&\&\ 0 < \rho_B < 1$

$$\text{Equilibrium[3]:}\left\{d_A \to \frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+(1+g\,\sigma)\,\rho_B^2},\right.$$

$$\left. d_B \to \frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+(1+g\,\sigma)\,\rho_B^2},\ e_A \to \frac{\rho_B^2}{1+g\,\sigma\,\rho_B+(1+g\,\sigma)\,\rho_B^2},\ e_B \to \frac{1}{1+g\,\sigma\,\rho_B+(1+g\,\sigma)\,\rho_B^2}\right\}$$

$$\text{Eigenvalues:}\left\{0,\ \frac{1}{g\,\rho_B\,(1+\rho_B)^2}\text{Root}\left[-\#1^3+\#1^2\left(-1-3\,\rho_B-2\,g\,\sigma\,\rho_B-3\,\rho_B^2-4\,g\,\sigma\,\rho_B^2-\rho_B^3-2\,g\,\sigma\,\rho_B^3\right)+\right.\right.$$

$$\left(g^3\,\sigma^3\,\rho_B^4\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\left(6\,g^3\,\sigma^3\,\rho_B^5\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\left(g^4\,\sigma^4\,\rho_B^5\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\left(16\,g^3\,\sigma^3\,\rho_B^6\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\left(7\,g^4\,\sigma^4\,\rho_B^6\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\left(26\,g^3\,\sigma^3\,\rho_B^7\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\left(21\,g^4\,\sigma^4\,\rho_B^7\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\left(30\,g^3\,\sigma^3\,\rho_B^8\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\left(35\,g^4\,\sigma^4\,\rho_B^8\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\left(26\,g^3\,\sigma^3\,\rho_B^9\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\left(35\,g^4\,\sigma^4\,\rho_B^9\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\left(16\,g^3\,\sigma^3\,\rho_B^{10}\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\left(21\,g^4\,\sigma^4\,\rho_B^{10}\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\left(6\,g^3\,\sigma^3\,\rho_B^{11}\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\left(7\,g^4\,\sigma^4\,\rho_B^{11}\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\left(g^3\,\sigma^3\,\rho_B^{12}\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\left(g^4\,\sigma^4\,\rho_B^{12}\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\#1\,\Big(-\rho_B-g\,\sigma\,\rho_B-4\,\rho_B^2-5\,g\,\sigma\,\rho_B^2-g^2\,\sigma^2\,\rho_B^2-6\,\rho_B^3-10\,g\,\sigma\,\rho_B^3-4\,g^2\,\sigma^2\,\rho_B^3-$$

$$4\,\rho_B^4-10\,g\,\sigma\,\rho_B^4-6\,g^2\,\sigma^2\,\rho_B^4-\rho_B^5-5\,g\,\sigma\,\rho_B^5-4\,g^2\,\sigma^2\,\rho_B^5-g\,\sigma\,\rho_B^6-g^2\,\sigma^2\,\rho_B^6+$$

$$\left(g^3\,\sigma^3\,\rho_B^4\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\left(5\,g^3\,\sigma^3\,\rho_B^5\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\left(10\,g^3\,\sigma^3\,\rho_B^6\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\left(10\,g^3\,\sigma^3\,\rho_B^7\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\left(5\,g^3\,\sigma^3\,\rho_B^8\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\left(g^3\,\sigma^3\,\rho_B^9\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)\Big)\ \&,$$

$$1\Big],\ \frac{1}{g\,\rho_B\,\left(1+\rho_B\right)^2}\mathrm{Root}\Big[-\#1^3+\#1^2\,\left(-1-3\,\rho_B-2\,g\,\sigma\,\rho_B-3\,\rho_B^2-4\,g\,\sigma\,\rho_B^2-\rho_B^3-2\,g\,\sigma\,\rho_B^3\right)+$$

$$\left(g^3\,\sigma^3\,\rho_B^4\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\left(6\,g^3\,\sigma^3\,\rho_B^5\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\left(g^4\,\sigma^4\,\rho_B^5\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\left(16\,g^3\,\sigma^3\,\rho_B^6\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\left(7\,g^4\,\sigma^4\,\rho_B^6\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\left(26\,g^3\,\sigma^3\,\rho_B^7\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\left(21\,g^4\,\sigma^4\,\rho_B^7\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\left(30\,g^3\,\sigma^3\,\rho_B^8\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\left(35\,g^4\,\sigma^4\,\rho_B^8\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\left(26\,g^3\,\sigma^3\,\rho_B^9\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)+$$

$$\left(35\, g^4\, \sigma^4\, \rho_B^9\right) \Big/ \left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2 \left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right) +$$

$$\left(16\, g^3\, \sigma^3\, \rho_B^{10}\right) \Big/ \left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2 \left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right) +$$

$$\left(21\, g^4\, \sigma^4\, \rho_B^{10}\right) \Big/ \left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2 \left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right) +$$

$$\left(6\, g^3\, \sigma^3\, \rho_B^{11}\right) \Big/ \left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2 \left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right) +$$

$$\left(7\, g^4\, \sigma^4\, \rho_B^{11}\right) \Big/ \left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2 \left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right) +$$

$$\left(g^3\, \sigma^3\, \rho_B^{12}\right) \Big/ \left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2 \left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right) +$$

$$\left(g^4\, \sigma^4\, \rho_B^{12}\right) \Big/ \left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2 \left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right) +$$

$$\sharp 1 \left(-\rho_B - g\,\sigma\,\rho_B - 4\,\rho_B^2 - 5\,g\,\sigma\,\rho_B^2 - g^2\,\sigma^2\,\rho_B^2 - 6\,\rho_B^3 - 10\,g\,\sigma\,\rho_B^3 - 4\,g^2\,\sigma^2\,\rho_B^3 - \right.$$

$$4\,\rho_B^4 - 10\,g\,\sigma\,\rho_B^4 - 6\,g^2\,\sigma^2\,\rho_B^4 - \rho_B^5 - 5\,g\,\sigma\,\rho_B^5 - 4\,g^2\,\sigma^2\,\rho_B^5 - g\,\sigma\,\rho_B^6 - g^2\,\sigma^2\,\rho_B^6 +$$

$$\left(g^3\, \sigma^3\, \rho_B^4\right) \Big/ \left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2 \left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right) +$$

$$\left(5\, g^3\, \sigma^3\, \rho_B^5\right) \Big/ \left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2 \left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right) +$$

$$\left(10\, g^3\, \sigma^3\, \rho_B^6\right) \Big/ \left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2 \left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right) +$$

$$\left(10\, g^3\, \sigma^3\, \rho_B^7\right) \Big/ \left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2 \left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right) +$$

$$\left(5\, g^3\, \sigma^3\, \rho_B^8\right) \Big/ \left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2 \left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right) +$$

$$\left.\left(g^3\, \sigma^3\, \rho_B^9\right) \Big/ \left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2 \left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)\right) \&,$$

$$\left.2\right],\ \frac{1}{g\,\rho_B\,(1+\rho_B)^2}\text{Root}\left[-\sharp 1^3 + \sharp 1^2 \left(-1 - 3\,\rho_B - 2\,g\,\sigma\,\rho_B - 3\,\rho_B^2 - 4\,g\,\sigma\,\rho_B^2 - \rho_B^3 - 2\,g\,\sigma\,\rho_B^3\right) + \right.$$

$$\left(g^3\, \sigma^3\, \rho_B^4\right) \Big/ \left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2 \left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right) +$$

$$\left(6\, g^3\, \sigma^3\, \rho_B^5\right) \Big/ \left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2 \left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right) +$$

$$\left(g^4\, \sigma^4\, \rho_B^5\right) \Big/ \left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2 \left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right) +$$

$$\left(16\, g^3\, \sigma^3\, \rho_B^6\right) \Big/ \left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2 \left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right) +$$

$$\left(7\, g^4\, \sigma^4\, \rho_B^6\right) \Big/ \left(\left(1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2\right)^2 \left(\frac{g\, \sigma\, \rho_B}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2} + \frac{g\, \sigma\, \rho_B^2}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2}\right)^2\right) +$$

$$\left(26\, g^3\, \sigma^3\, \rho_B^7\right) \Big/ \left(\left(1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2\right)^2 \left(\frac{g\, \sigma\, \rho_B}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2} + \frac{g\, \sigma\, \rho_B^2}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2}\right)^2\right) +$$

$$\left(21\, g^4\, \sigma^4\, \rho_B^7\right) \Big/ \left(\left(1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2\right)^2 \left(\frac{g\, \sigma\, \rho_B}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2} + \frac{g\, \sigma\, \rho_B^2}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2}\right)^2\right) +$$

$$\left(30\, g^3\, \sigma^3\, \rho_B^8\right) \Big/ \left(\left(1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2\right)^2 \left(\frac{g\, \sigma\, \rho_B}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2} + \frac{g\, \sigma\, \rho_B^2}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2}\right)^2\right) +$$

$$\left(35\, g^4\, \sigma^4\, \rho_B^8\right) \Big/ \left(\left(1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2\right)^2 \left(\frac{g\, \sigma\, \rho_B}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2} + \frac{g\, \sigma\, \rho_B^2}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2}\right)^2\right) +$$

$$\left(26\, g^3\, \sigma^3\, \rho_B^9\right) \Big/ \left(\left(1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2\right)^2 \left(\frac{g\, \sigma\, \rho_B}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2} + \frac{g\, \sigma\, \rho_B^2}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2}\right)^2\right) +$$

$$\left(35\, g^4\, \sigma^4\, \rho_B^9\right) \Big/ \left(\left(1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2\right)^2 \left(\frac{g\, \sigma\, \rho_B}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2} + \frac{g\, \sigma\, \rho_B^2}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2}\right)^2\right) +$$

$$\left(16\, g^3\, \sigma^3\, \rho_B^{10}\right) \Big/ \left(\left(1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2\right)^2 \left(\frac{g\, \sigma\, \rho_B}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2} + \frac{g\, \sigma\, \rho_B^2}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2}\right)^2\right) +$$

$$\left(21\, g^4\, \sigma^4\, \rho_B^{10}\right) \Big/ \left(\left(1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2\right)^2 \left(\frac{g\, \sigma\, \rho_B}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2} + \frac{g\, \sigma\, \rho_B^2}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2}\right)^2\right) +$$

$$\left(6\, g^3\, \sigma^3\, \rho_B^{11}\right) \Big/ \left(\left(1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2\right)^2 \left(\frac{g\, \sigma\, \rho_B}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2} + \frac{g\, \sigma\, \rho_B^2}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2}\right)^2\right) +$$

$$\left(7\, g^4\, \sigma^4\, \rho_B^{11}\right) \Big/ \left(\left(1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2\right)^2 \left(\frac{g\, \sigma\, \rho_B}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2} + \frac{g\, \sigma\, \rho_B^2}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2}\right)^2\right) +$$

$$\left(g^3\, \sigma^3\, \rho_B^{12}\right) \Big/ \left(\left(1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2\right)^2 \left(\frac{g\, \sigma\, \rho_B}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2} + \frac{g\, \sigma\, \rho_B^2}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2}\right)^2\right) +$$

$$\left(g^4\, \sigma^4\, \rho_B^{12}\right) \Big/ \left(\left(1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2\right)^2 \left(\frac{g\, \sigma\, \rho_B}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2} + \frac{g\, \sigma\, \rho_B^2}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2}\right)^2\right) +$$

$$\#1 \Big(-\rho_B - g\, \sigma\, \rho_B - 4\, \rho_B^2 - 5\, g\, \sigma\, \rho_B^2 - g^2\, \sigma^2\, \rho_B^2 - 6\, \rho_B^3 - 10\, g\, \sigma\, \rho_B^3 - 4\, g^2\, \sigma^2\, \rho_B^3 -$$

$$4\, \rho_B^4 - 10\, g\, \sigma\, \rho_B^4 - 6\, g^2\, \sigma^2\, \rho_B^4 - \rho_B^5 - 5\, g\, \sigma\, \rho_B^5 - 4\, g^2\, \sigma^2\, \rho_B^5 - g\, \sigma\, \rho_B^6 - g^2\, \sigma^2\, \rho_B^6 +$$

$$\left(g^3\, \sigma^3\, \rho_B^4\right) \Big/ \left(\left(1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2\right)^2 \left(\frac{g\, \sigma\, \rho_B}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2} + \frac{g\, \sigma\, \rho_B^2}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2}\right)^2\right) +$$

$$\left(5\, g^3\, \sigma^3\, \rho_B^5\right) \Big/ \left(\left(1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2\right)^2 \left(\frac{g\, \sigma\, \rho_B}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2} + \frac{g\, \sigma\, \rho_B^2}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2}\right)^2\right) +$$

$$\left(10\, g^3\, \sigma^3\, \rho_B^6\right) \Big/ \left(\left(1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2\right)^2 \left(\frac{g\, \sigma\, \rho_B}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2} + \frac{g\, \sigma\, \rho_B^2}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2}\right)^2\right) +$$

$$\left(10\, g^3\, \sigma^3\, \rho_B^7\right) \Big/ \left(\left(1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2\right)^2 \left(\frac{g\, \sigma\, \rho_B}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2} + \frac{g\, \sigma\, \rho_B^2}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2}\right)^2\right) +$$

$$\left(5\, g^3\, \sigma^3\, \rho_B^8\right) \Big/ \left(\left(1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2\right)^2 \left(\frac{g\, \sigma\, \rho_B}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2} + \frac{g\, \sigma\, \rho_B^2}{1 + g\, \sigma\, \rho_B + \rho_B^2 + g\, \sigma\, \rho_B^2}\right)^2\right) +$$

$$\left(g^3\,\sigma^3\,\rho_B^9\right)\Big/\left(\left(1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2\right)^2\left(\frac{g\,\sigma\,\rho_B}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}+\frac{g\,\sigma\,\rho_B^2}{1+g\,\sigma\,\rho_B+\rho_B^2+g\,\sigma\,\rho_B^2}\right)^2\right)\ \&,\ 3\Big]\Big\}$$

Condition satisfied(ev[2]<0): $\sigma > 0$ && $g > 0$ && $0 < \rho_B < 1$

Condition satisfied(ev[3]<0): $\sigma > 0$ && $g > 0$ && $0 < \rho_B < 1$

Condition satisfied(ev[4]<0): False
