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> #HW 10 Hrudai Battini
  with(LinearAlgebra):
> #1
  #X=0 is always a fixed point of the equation x(n) = x(n-1)/(x
  (n-1)+c) as this simplfied to x = x/x+c and solving for the fixed
  #points returns x = 0 and 1-c. The stable fixed point takes the
  derivative of x(n) which equals 1/(x+c) + x/(x+c)^2. For x=0 to
  #be a stable fixed point, |1/c| < 1. Therfore c is greater than 1
  or less than negative 1. For 1-c, c>1 but less than 3.
> #2
  a := linalg[matrix](2,2,[-16/3*0.3,5*0.6,-7*0.3,13/2*0.6]);
  evalm(a^1000);
```

$$a := \begin{bmatrix} -1.600000000 & 3.0 \\ -2.1 & 3.900000000 \end{bmatrix}$$

$$\begin{bmatrix} -3.397667283 \times 10^{35} & 6.267256575 \times 10^{35} \\ -4.387079623 \times 10^{35} & 8.092303133 \times 10^{35} \end{bmatrix} \quad (1)$$

```
> b := linalg[matrix](2,2,[92/3*0.3,-25*0.6,-105/2*0.3,89/2*0.6]);
  #Oscialates Unstable
  evalm(b^1000);
```

$$b := \begin{bmatrix} 9.200000000 & -15.0 \\ -15.75000000 & 26.70000000 \end{bmatrix}$$

$$\begin{bmatrix} 1.984332416 \times 10^{1551} & -3.330718487 \times 10^{1551} \\ -3.497254406 \times 10^{1551} & 5.870170649 \times 10^{1551} \end{bmatrix} \quad (2)$$

```
> c := linalg[matrix](2,2,[-177/4*0.3,75/2*0.6,-105/2*0.3,89/2*0.6]
  );
  evalm(c^1000);
```

$$c := \begin{bmatrix} -13.27500000 & 22.50000000 \\ -15.75000000 & 26.70000000 \end{bmatrix}$$

$$\begin{bmatrix} -1.178923817 \times 10^{1128} & 1.998932780 \times 10^{1128} \\ -1.399252944 \times 10^{1128} & 2.372513420 \times 10^{1128} \end{bmatrix} \quad (3)$$

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>
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2i)
$$\begin{bmatrix} \frac{-16}{3}-\lambda & 5 \\ -7 & \frac{13}{2}-\lambda \end{bmatrix}$$

$$\left(\frac{-16}{3}-\lambda\right)\left(\frac{13}{2}-\lambda\right) - -35 = \lambda^2 - \frac{7}{6} - \frac{104}{3} + 35$$

$$6\lambda^2 - 7\lambda + 2 \qquad \lambda^2 - \frac{7}{6}\lambda + \frac{1}{3}$$

$$(3\lambda - 2)(2\lambda - 1) \qquad \lambda = \frac{1}{2}, \frac{2}{3} < 1 \text{ Stable}$$

2ii
$$\begin{bmatrix} \frac{92}{3}-\lambda & -25 \\ -35 & \frac{-57}{2}-\lambda \end{bmatrix}$$

$$\left(\frac{92}{3}-\lambda\right)\left(\frac{-57}{2}-\lambda\right) - (-25)(-35)$$

$$\lambda^2 - \frac{13}{6}\lambda + 875 - 874 \qquad \lambda^2 - \frac{13}{6}\lambda + 1$$

$$6\lambda^2 - 13\lambda + 6 \qquad (3\lambda - 2)(2\lambda - 3)$$

$$\lambda = \frac{2}{3}, \frac{3}{2} \qquad \frac{3}{2} > 1 \text{ Not stable}$$

2iii.
$$\begin{bmatrix} \frac{-177}{4}-\lambda & \frac{25}{2} \\ \frac{-105}{2} & \frac{89}{2}-\lambda \end{bmatrix}$$

$$\lambda^2 - \frac{1}{4}\lambda - \frac{3}{8} \qquad 8\lambda^2 - 2\lambda - 3$$

$$(4\lambda - 3)(2\lambda + 1) \qquad \lambda = \frac{-1}{2}, \frac{3}{4} < 1$$

stable