(b) \( x_n + 5x_{n-1} = 0 \), \( x_1 = 9 \), \( x_2 = 33 \)
\( x^2 - 5x + 4 = 0 \)
\( (x-4)(x-1) = 0 \)
\( x = 4 \), \( x = 1 \)
\( x_n = A_4^1 + A_1^1 \)
\( x_1 = 9 = A_4^1 + A_1^1 \)
\( x_2 = 33 = A_4^1 + A_1^1 \)
\( x_2 = 33 = 16A_4 + A_1 \)
\( 33 = 16A_4 + 9 - 4A_1 \)
\( 24 = 12A_4 \)
\( A_4 = 2 \)
\( A_1 = 9 - 4A_2 \)
\( A_2 = 1 \)
Then:
\( x_n = 2 \cdot 4^n + 1 \cdot 1^n \)
\( x_n = 1 + 2 \cdot 4^n \)

(b) \( x_{n+1} = x_n + y_n \), \( y_{n+1} = \frac{3x_n - y_n}{16} \)
\( x_{n+1} = x_n + y_n \)
\( y_{n+1} = x_{n+1} - x_n \)
\( x_{n+1} = x_n + \frac{3x_n - y_n}{16} \)
\( x_{n+1} = 3x_n - y_n \)
\( x_{n+1} = x_n + 3x_n - y_n \)
\( -4x_{n+1} + 3x_n = y_n \)
\( -4x_{n+1} + 3x_n + y_n = 0 \)
\( -4x_{n+2} + x_n + y_n = 0 \)
\( -4x_{n+2} + x_n = 0 \)
\( (2x-1)(2x-1) = 0 \)
\( x = \frac{1}{2}, x = -\frac{1}{2} \)
\( x_n = A\left(\frac{1}{2}\right)^n + B\left(-\frac{1}{2}\right)^n \)
(decreases w/ oscillations)
\( x_n + x_0 = 0 \)
\( x^3 + 1 = 0 \)
\( \pm \frac{\sqrt[4]{(4)(0)(1)}}{3} = \pm \frac{2}{3}i = \pm \frac{2}{3}i \)
\( a + bi \)
\( a = 0, b = 1 \)
\( r = (a^2 + b^2)^{\frac{1}{2}} = 1 \)
\( \tan \theta = \frac{b}{a} \)
\( \tan \phi = \frac{1}{2} \)
\( \phi = \frac{\pi}{2} \)
\( x_n = 1^n (\cos n\pi/2 + i\sin n\pi/2) \)
\( x_0 = C_0 \cos n\pi/2 + C_1 \sin n\pi/2 \)

16a) \( R_{n+1} = (1 - f)R_n + M_n \)

The # of RBCs in circulation on day \( n+1 \) is the # of RBCs in circulation on day \( n \) which were not removed by the spleen and the # of RBCs produced by marrow on day \( n \).

\( M_{n+1} = yS_R \)

The # of RBCs produced by marrow on \( n+1 \) is the # produced / # lost times the # of RBCs removed by the spleen.

\( M_n = R_{n+1} - (1 - f)R_n \)
\( M_{n+1} = R_{n+2} - (1 - f)R_{n+1} = yS_R \)
\( R_{n+2} - (1 - f)R_{n+1} - xS_R R_n = 0 \)
\( b = 1 - f \)
\( a = \frac{1 - (1 - f)^2 + 4xf}{2} \)

b) \( \lambda_{1,2} = \frac{1 - (1 - f)^2 + 4xf}{2} \)
\( \lambda_1 = 1 - f + \sqrt{1 - 2f + f^2 + 4xf} \)
\( \lambda_2 = 1 - f - \sqrt{1 - 2f + f^2 + 4xf} \)
\( \lambda_1, \lambda_2 \) is positive because \( \lambda_0 \) is negative.
\( R_n = A (1)^n + B \left( \frac{-1}{-f - \sqrt{1-\varepsilon^2 + 4\varepsilon^2}} \right)^n \)

since \( \lambda_1 \) is positive it must be held at 1 so that it does not continuously increase or decrease.

since \( \lambda_2 \) is \( \infty \) it will oscillate and keep \( R_n \) relatively constant.

\( R_n = A (1)^n + B \left( \frac{-1}{-f - \sqrt{1-\varepsilon^2 + 4\varepsilon^2}} \right)^n \)

\( \lambda \) must be \( -1 < \lambda \leq 0 \)

By keeping \( \lambda_1 = 1 \), this makes
\[ -f - \frac{\sqrt{1-\varepsilon^2 + 4\varepsilon^2}}{2} = \frac{1}{\varepsilon} \] or
\[ -f - \frac{\sqrt{1-\varepsilon^2 + 4\varepsilon^2}}{1-\varepsilon^2 + 4\varepsilon^2} = \frac{1}{\varepsilon} \]

\[ x - \varepsilon + 4\varepsilon^2 = x + \varepsilon + \varepsilon^2 \]
\[ -\varepsilon + 4\varepsilon^2 = \varepsilon^2 \]
\[ 4\varepsilon^2 = 4\varepsilon \]
\[ \varepsilon = 1 \]

\( x = 1 - \frac{\sqrt{1-\varepsilon^2 + 4\varepsilon^2}}{\sqrt{1-\varepsilon^2 + 4\varepsilon^2}} \)

\( \lambda_2 = -\frac{1}{\varepsilon} - \frac{\sqrt{1-\varepsilon^2 + 4\varepsilon^2}}{\sqrt{1-\varepsilon^2 + 4\varepsilon^2}} \)

\( R_n = A \lambda_1^n + B \lambda_2^n = A (1)^n + B (-\varepsilon)^n \)

recall \( f \) is a fraction of RBC's removed.

and \(-1 < f < 0 \) \( R_n \) oscillates around \( A \)

\( R_n = A + B (-f)^n \)