1) What is the definition of eigenvalue? of eigenvector?

2) How do we solve for eigenvalues? for eigenvectors?

3) If a matrix is triangular, are the eigenvalues on the diagonal? Why or why not?

4) What is the Maple output of the Eigenvectors command applied to $A = \begin{bmatrix} \frac{6}{10} & \frac{4}{10} \\ -\frac{125}{1000} & \frac{12}{10} \end{bmatrix}$?

5) What are the eigenvalues of A?

6) What are the eigenvectors of A?

7) Do the eigenvectors of A span the entire space they are inside of ($\mathbb{R}^2$ for this example)?

8) How can we tell?

9) Fill in the blanks if $\vec{x}_0$ is an eigenvector of A: $\vec{x}_1 = A\vec{x}_0 =$ _______ $\vec{x}_0$ $\vec{x}_k = A^k\vec{x}_0 =$ _______ $\vec{x}_0$

10) If the eigenvectors of A span the entire space, fill in the blanks to write any initial condition $\vec{x}_0$ as a linear combination of the eigenvectors of A

$\vec{x}_0 = a_1$ _______ $+ a_2$ _______

11) If it exists, what is the eigenvector decomposition for A?

12) What does the trajectory look like for an initial vector in quadrant 1 that does not begin on either eigenvector? Select one:
   - dies off to the origin asymptotic to one eigenvector (dominant eigenvalue < 1)
   - grows asymptotic to one eigenvector (dominant eigenvalue > 1)
   - comes in parallel to one eigenvector with smaller and smaller contributions until we hit the other (dominant eigenvalue $= 1$)

13) Say that A represents the changes from one year to the next in a system of foxes (x-value) and rabbits (y-value). For most initial conditions, what ratio do the populations tend to in the longrun?

_____ foxes to _____ rabbits which we get from the dominant eigenvector of _____

14) What is the yearly rate (growth rate, die off rate, or stability rate)? Show work.

15) Sketch a by-hand plot of the two eigenvectors. Add to the trajectory plot by selecting a starting position in the 1st quadrant that is not on either eigenvector and following the long-term behavior.