Date _____

MTH 261
Linear Algebra
Summer 2017
Diagonalization

Find partners, and follow the instructions. You will not turn this in, but you must be working diligently to get attendance credit.

1. Diagonalize these matrices.

   (a) $A = \begin{bmatrix} 0 & -6 \\ -1 & -1 \end{bmatrix}$

   (b) $A = \begin{bmatrix} 1.4 & 0.4 & 0.8 \\ 0 & 2 & 0 \\ -1.2 & 0.8 & 3.6 \end{bmatrix}$

2. For each of the above matrices, find an expression for A^k. What I mean is, write down

$$A^k = \begin{bmatrix} \text{terms involving } k & \text{terms involving } k \\ \text{terms involving } k & \text{terms involving } k \end{bmatrix}$$

3. Show why the matrix $\begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ cannot be diagonalized.

4. Diagonalize the matrix $A = \begin{bmatrix} 0.94 & 0.10 \\ 0.06 & 0.90 \end{bmatrix}$. Find an expression for A^k. Then find $\lim_{k \to \infty} A^k$.

5. Suppose that there are sick mice and healthy mice. Every week, 6% of healthy mice become sick, and 10% of sick mice become healthy. Write down a change-of-state matrix for this situation. You should find the matrix from the above problem.

   Now assume that there were initially 50% healthy mice, and 50% sick mice. The state vector $\begin{bmatrix} .5 \\ .5 \end{bmatrix}$ describes this initial state.

   What percentage of mice are healthy and sick one week later? Two weeks later? ∞ weeks later?