

Math 272: Linear Algebra with Applications  
HW for Section 5.3

1. Determine whether the following matrices are diagonalizable. If they are, give an explicit diagonalization.

(a)  $A = \begin{bmatrix} 2 & 1 \\ 2 & 3 \end{bmatrix}$

(b)  $A = \begin{bmatrix} 4 & 1 \\ -1 & 2 \end{bmatrix}$

(c)  $A = \begin{bmatrix} 1 & -3 & 3 \\ 0 & 5 & -5 \\ 0 & -5 & 5 \end{bmatrix}$

(d)  $A = \begin{bmatrix} 3 & 0 & 0 \\ 0 & 1 & 2 \\ 0 & 2 & 1 \end{bmatrix}$

2. Find a formula for  $A^n$  for the following matrices. (You may use your answers from the previous question.)

(a)  $A = \begin{bmatrix} 2 & 1 \\ 2 & 3 \end{bmatrix}$

(b)  $A = \begin{bmatrix} 1 & -3 & 3 \\ 0 & 5 & -5 \\ 0 & -5 & 5 \end{bmatrix}$

3. Let  $T$  be the transformation from  $\mathbb{R}^2$  to  $\mathbb{R}^2$  defined by  $T(x, y) = (14x + 2y, 2x + 11y)$ . Find a basis for the domain in which  $T$  is represented by a diagonal matrix. Use this to give a geometric interpretation of  $T$ .