

Math 251 X01 Assignment Three

Name: \_\_\_\_\_

**Assignments must be completed on this paper. Marks may be deducted for not showing all your work.**

1. [5 marks] Find all values of  $k$  for which the following matrix is invertible:

$$A = \begin{bmatrix} 2 & k & -8 \\ 1 & 4 & k \\ -2 & -2 & 6 \end{bmatrix}.$$

2. [8 marks] Find a matrix  $P$  that diagonalizes  $A = \begin{bmatrix} 1 & 0 & 1 \\ 3 & 2 & -3 \\ 1 & 0 & 1 \end{bmatrix}$ .

3. [4 marks] Find a basis for  $W^\perp$  if

$$W = \left\{ \begin{bmatrix} x \\ y \\ z \end{bmatrix} \text{ such that } x = t, y = -4t, z = 2t \right\}.$$

4. [8 marks] Use the Gram-Schmidt process to find an orthogonal basis for

$$\text{span}\left(\begin{bmatrix} 1 \\ 6 \\ 2 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ -2 \\ 3 \\ -1 \end{bmatrix}, \begin{bmatrix} 2 \\ 1 \\ -1 \\ -1 \end{bmatrix}\right).$$