

Name KEY

Math 268, Quiz #6, Spring 2012

1. Find the eigenvalues and eigenvectors of the matrix  $A = \begin{bmatrix} -4 & -1 \\ 6 & 1 \end{bmatrix}$ .

$$\begin{vmatrix} -4-\lambda & -1 \\ 6 & 1-\lambda \end{vmatrix} = (-4-\lambda)(1-\lambda) + 6 = 0$$

$$-4 + 4\lambda - \lambda + \lambda^2 + 6 = 0$$

$$\lambda^2 + 3\lambda + 2 = 0$$

$$(\lambda + 2)(\lambda + 1) = 0$$

$$\lambda = -2, \lambda = -1$$

$$\begin{bmatrix} -4 - (-2) & -1 \\ 6 & 1 - (-2) \end{bmatrix} = \begin{bmatrix} -2 & -1 \\ 6 & 3 \end{bmatrix}$$

$$-2x_1 - x_2 = 0$$

$$-2x_1 = x_2$$

$$x_1 = -\frac{1}{2}x_2$$

$$v_1 = \begin{bmatrix} 1 \\ -2 \end{bmatrix}$$

$$\begin{bmatrix} -4 - (-1) & -1 \\ 6 & 1 - (-1) \end{bmatrix} = \begin{bmatrix} -3 & -1 \\ 6 & 2 \end{bmatrix}$$

$$-3x_1 - x_2 = 0$$

$$-3x_1 = x_2$$

$$x_1 = -\frac{1}{3}x_2$$

$$v_2 = \begin{bmatrix} 1 \\ -3 \end{bmatrix}$$