

Score:

Name: Solutions
Period (circle one): 1 2 3 4 5 6
Team (circle one): a b c d e f

SM 261 – Matrix Algebra – Quiz 20
Section 5.1/2 – Eigenvalues and Eigenvectors

1. Let $A = \begin{bmatrix} 7 & 2 \\ -4 & 1 \end{bmatrix}$. Find the eigenvalues and eigenvectors for A .

$$\det \begin{bmatrix} 7-\lambda & 2 \\ -4 & 1-\lambda \end{bmatrix} = 0 \quad 7 - 8\lambda + \lambda^2 + 8 = 0 \Rightarrow \lambda^2 - 8\lambda + 15 = 0$$
$$\Rightarrow (\lambda - 3)(\lambda - 5) = 0 \Rightarrow \boxed{\lambda = 3, 5}$$

$\lambda = 5$ $\begin{bmatrix} 2 & 2 \\ -4 & -4 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \vec{0} \Rightarrow 2x_1 + 2x_2 = 0 \Rightarrow x_1 = -x_2 \Rightarrow \boxed{V_{\lambda=5} = \begin{bmatrix} -1 \\ 1 \end{bmatrix}}$

$\lambda = 3$ $\begin{bmatrix} 4 & 2 \\ -4 & -2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \vec{0} \Rightarrow 4x_1 + 2x_2 = 0 \Rightarrow 4x_1 = -2x_2 \Rightarrow x_1 = -\frac{1}{2}x_2$

$$\boxed{V_{\lambda=3} = \begin{bmatrix} -1 \\ 2 \end{bmatrix}}$$

2. What are the eigenvalues for A^{-1} ?

$$\boxed{\lambda = \frac{1}{3}, \frac{1}{5}}$$