

Math 225, Fall 2011
Worksheet for the Final

1) Consider the matrix

$$A = \begin{bmatrix} -9 & -7 \\ 14 & 12 \end{bmatrix}$$

- a) Find the eigenvalues λ_1 and λ_2 of A .
- b) Find a matrix P such that $P^{-1}AP = \begin{bmatrix} \lambda_1 & 0 \\ 0 & \lambda_2 \end{bmatrix}$.

2) Find the 3×3 matrix P which is the orthogonal projection of \mathbb{R}^3 onto the subspace which is spanned by $\left\{ \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 1 \\ -1 \end{bmatrix} \right\}$.

3) Find the least-squares solution $\mathbf{v} = \begin{bmatrix} x \\ y \end{bmatrix}$ to the system of linear equations

$$x - y = 0$$

$$x + y = 1$$

$$x + 5y = 0$$