

## Homework - July 13

### Section 5.1

4. Multiply  $\begin{bmatrix} 2 & 1 \\ 1 & 4 \end{bmatrix} \begin{bmatrix} -1 + \sqrt{2} \\ 1 \end{bmatrix} = \begin{bmatrix} -1 + 2\sqrt{2} \\ 3 + \sqrt{2} \end{bmatrix}$ . If  $\lambda \begin{bmatrix} -1 + \sqrt{2} \\ 1 \end{bmatrix} = \begin{bmatrix} -1 + 2\sqrt{2} \\ 3 + \sqrt{2} \end{bmatrix}$ .

Then,

$$\begin{aligned} \lambda(-1 + \sqrt{2}) &= -\lambda + \lambda\sqrt{2} = -1 + 2\sqrt{2} \\ \text{and } \lambda(1) &= \lambda = 3 + \sqrt{2} \end{aligned}$$

Check  $-(3 + \sqrt{2}) + (3 + \sqrt{2})\sqrt{2} = -3 - \sqrt{2} + 3\sqrt{2} + 2 = -1 + 2\sqrt{2}$ .

Therefore,  $\begin{bmatrix} -1 + \sqrt{2} \\ 1 \end{bmatrix}$  is an eigenvector with eigenvalue  $\lambda = 3 + \sqrt{2}$ .