

Math 1553 Worksheet §§6.1–6.5

1. a) Find the standard matrix  $B$  for  $\text{proj}_L$ , where  $L = \text{Span} \left\{ \begin{pmatrix} 1 \\ 1 \\ -1 \end{pmatrix} \right\}$ .

b) What are the eigenvalues of  $B$ ? What are their algebraic multiplicities?

2. Find an orthonormal basis for the subspace of  $\mathbf{R}^4$  spanned by  $\begin{pmatrix} 1 \\ -1 \\ 1 \\ 1 \end{pmatrix}$ ,  $\begin{pmatrix} 6 \\ -2 \\ 2 \\ 6 \end{pmatrix}$ , and  $\begin{pmatrix} 4 \\ 20 \\ -14 \\ 10 \end{pmatrix}$ .

3. a) Find the least squares solution  $\hat{x}$  to  $Ax = e_1$ , where  $A = \begin{pmatrix} 1 & 1 \\ 0 & 1 \\ -1 & 1 \end{pmatrix}$ .

b) Find the best fit line  $y = Ax + B$  through the points  $(0, 0)$ ,  $(1, 8)$ ,  $(3, 8)$ , and  $(4, 20)$ .

c) Set up an equation to find the best fit parabola  $y = Ax^2 + Bx + C$  through the points  $(0, 0)$ ,  $(1, 8)$ ,  $(3, 8)$ , and  $(4, 20)$ .