

MATH 2270: QUIZ 8 (LAST ONE!)

1) a) (2 points) Define what it means for a set  $\{\mathbf{v}_1, \dots, \mathbf{v}_k\}$  to be **orthonormal**.

b) (2 points) Write down **two** orthonormal bases for  $\mathbb{R}^2$ .

2) a) (2 points) Compute the orthogonal projection of  $\begin{bmatrix} 1 \\ 7 \end{bmatrix}$  onto the line through  $\begin{bmatrix} -4 \\ 2 \end{bmatrix}$  and the origin.

b) (2 points) Use your answer from part a) to write down an orthogonal basis,  $\{\mathbf{b}_1, \mathbf{b}_2\}$  for  $\mathbb{R}^2$  where  $\mathbf{b}_1 = \begin{bmatrix} 1 \\ 7 \end{bmatrix}$ .

3) (2 points) Find the closest point to  $\mathbf{y}$  in the subspace  $W$  spanned by  $\mathbf{v}_1, \mathbf{v}_2$ .

$$\mathbf{y} = \begin{bmatrix} 3 \\ 1 \\ 5 \\ 1 \end{bmatrix}, \mathbf{v}_1 = \begin{bmatrix} 3 \\ 1 \\ -1 \\ 1 \end{bmatrix}, \mathbf{v}_2 = \begin{bmatrix} 1 \\ -1 \\ 1 \\ -1 \end{bmatrix}$$