

You have 20 minutes to complete this quiz. To receive full credit, you must justify your answers.

Name : \_\_\_\_\_

1. (5 points) Find an orthonormal basis of the subspace  $H$  of  $\mathbb{R}^4$  below.

$$H = \text{Span} \left\{ \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}, \begin{bmatrix} -1 \\ 4 \\ 4 \\ 1 \end{bmatrix}, \begin{bmatrix} 4 \\ -2 \\ 2 \\ 0 \end{bmatrix} \right\}$$

2. (5 points) Find a basis for the orthogonal complement of the following subspace of  $\mathbb{R}^4$ .

$$W = \text{span} \left\{ \begin{bmatrix} 1 \\ 2 \\ 5 \\ 4 \end{bmatrix}, \begin{bmatrix} 3 \\ 7 \\ 3 \\ 12 \end{bmatrix} \right\}$$