

MATH 307D FALL 2000 TEST #3

Write clearly. Box or underline your final answers to computational questions.
All questions carry equal weight.

1. Apply the Gram-Schmidt orthonormalization process to the following sequence of vectors:

$$\begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 1 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 1 \\ 0 \end{bmatrix}.$$

2. Find the orthogonal projection of the vector

$$\begin{bmatrix} 2 \\ 0 \\ 2 \\ 4 \end{bmatrix}$$

onto the subspace of \mathbb{R}^4 spanned by

$$\begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ -1 \\ -1 \\ 1 \end{bmatrix}.$$

3. Find an orthonormal basis for the kernel of the matrix

$$\begin{bmatrix} 2 & -6 & 1 & -2 \\ -6 & 10 & -1 & 4 \end{bmatrix}.$$

4. Find the least squares straight line fit $y = c_0 + c_1x$ to the data points $(2, 1), (3, 1), (4, 2)$.