Math 261

Final Review:

Be prepared to answer all questions on the first two exams and the review for the 2nd exam. Also be prepared to answer the following types of questions:

1Find the distance between u= $\begin{bmatrix}1\\1\\2\end{bmatrix}$ and v= $\begin{bmatrix}2\\1\\4\end{bmatrix}$

2) Suppose to that a vector y is orthogonal to vectors u and v. Show that y is orthogonal to the vector u+v

3) Determine if the following sets of vectors are orthogonal:

$$w=\left\{\begin{bmatrix}1\\-2\\1\end{bmatrix},\begin{bmatrix}0\\1\\2\end{bmatrix},\begin{bmatrix}-5\\-2\\1\end{bmatrix}\right\}$$

4) Show that w= $\left\{\begin{bmatrix}3\\1\end{bmatrix},\begin{bmatrix}-2\\6\end{bmatrix}\right\}$ is an orthogonal basis . Express x= $\begin{bmatrix}1\\1\end{bmatrix}$ as linear combination of the vectors in w.

5) Let y= $\begin{bmatrix}1\\2\end{bmatrix}$ and u= $\begin{bmatrix}2\\2\end{bmatrix}$. Write y as a sum of a vector in the span {u} and a vector orthogonal to u.

6) Find the best approximation to z by vectors of the form $c_1 v_1 + c_2 v_2$

z= $\begin{bmatrix} 3 \\ -7 \\ 2 \\ 3 \end{bmatrix}$ and v1= $\begin{bmatrix} 2 \\ -1 \\ -3 \\ 1 \end{bmatrix}$ v2= $\begin{bmatrix} 1 \\ 1 \\ 0 \\ -1 \end{bmatrix}$

7) Use the Gram-Schmidt process to produce an orthogonal basis for

$$w = \left\{ \begin{bmatrix} 0 \\ 4 \\ 2 \end{bmatrix}, \begin{bmatrix} 5 \\ 6 \\ -7 \end{bmatrix} \right\}$$

8) Find a least- squares solution of the following inconsistent system Ax=b for

$A = \begin{bmatrix} 4 & 0 \\ 0 & 2 \\ 1 & 1 \end{bmatrix}$, b= $\begin{bmatrix} 2 \\ 0 \\ 11 \end{bmatrix}$