NAME:_____

Math 370 **Take-Home Quiz #2** Due Friday 3/10

This quiz should take you approximately 25 minutes. You can use your calculator, your book, and your notes, but do not work together and do not get help.

(10 pts) 1. Let $A = \begin{pmatrix} 1 & a \\ a & 1 \end{pmatrix}$. Find the eigenvalues of A. Show work.

(10 pts) 2. The matrix $\begin{pmatrix} 1 & -1 & 1 \\ -3 & -1 & -1 \\ -9 & -7 & 5 \end{pmatrix}$ has eigenvalues -2, 3 and 4.
Find an eigenvector for the $\lambda = -2$ eigenvalue.

(10 pts) 3. Each vector v,w,x,y,z is an eigenvector for one of the matrices A,B,C,D,E. Match them up.

$$A = \begin{pmatrix} 2 & 2 \\ 1 & 1 \end{pmatrix} \qquad B = \begin{pmatrix} 4 & 2 \\ 0 & -2 \end{pmatrix} \qquad C = \begin{pmatrix} 3 & 3 \\ 2 & 4 \end{pmatrix}$$

$$D = \begin{pmatrix} 3 & 2 & -1 \\ 4 & 1 & -4 \\ 0 & 4 & 2 \end{pmatrix} \qquad E = \begin{pmatrix} 1 & -2 & -3 \\ -1 & 3 & -2 \\ -1 & 0 & 1 \end{pmatrix}$$

$$v = \begin{pmatrix} 2 \\ 0 \\ 2 \end{pmatrix}, \quad w = \begin{pmatrix} 6 \\ 3 \end{pmatrix}, \quad x = \begin{pmatrix} -4 \\ 1 \\ 2 \end{pmatrix}, \quad y = \begin{pmatrix} 3 \\ -2 \end{pmatrix}, \quad z = \begin{pmatrix} 2 \\ -6 \end{pmatrix}$$

(10 pts) 4. Let $F(t) = t\cos(t)\mathbf{i} + t\sin(t)\mathbf{j} + t\mathbf{k}$. Find the velocity vector at $t = \pi$.

(10 pts) 5. Find three vectors **u**, **v**, and **w** so that:

$$\mathbf{u} \times (\mathbf{v} \times \mathbf{w}) \neq (\mathbf{u} \times \mathbf{v}) \times \mathbf{w}$$

Compute both sides to justify your choice.