Quiz #1
Math 35
February 2, 2009 **Name:**

Use the matrices given below for problem #1.

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 1 & 4 \end{bmatrix} \qquad C = \begin{bmatrix} 3 & -1 & 3 \\ 4 & 1 & 5 \\ 2 & 1 & 3 \end{bmatrix} \qquad E = \begin{bmatrix} 2 & -4 & 5 \\ 0 & 1 & 4 \\ 3 & 2 & 1 \end{bmatrix}$$

$$B = \begin{bmatrix} 1 & 0 \\ 2 & 1 \\ 3 & 2 \end{bmatrix} \qquad D = \begin{bmatrix} 3 & -2 \\ 2 & 4 \end{bmatrix} \qquad F = \begin{bmatrix} -4 & 5 \\ 2 & 3 \end{bmatrix}$$

1. (a) $3D + 2F$

$$\begin{aligned} 3D + 2F &= \begin{bmatrix} 9 & -6 \\ 6 & 12 \end{bmatrix} + \begin{bmatrix} -8 & 10 \\ 4 & 6 \end{bmatrix} \\ &= \begin{bmatrix} 1 & 4 \\ 10 & 18 \end{bmatrix} \end{aligned}$$

   (b) $(A - B)^T$
   Since A and B are not the same dimension, $A - B$ is not defined.

2. Is the matrix $\begin{bmatrix} 4 & 1 \\ 0 & -3 \end{bmatrix}$ a linear combination of the matrices $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ and $\begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$? Justify your answer.

   If it is possible to write the matrix as a linear combination we would need to find scalars a and b so that the following equation is true.

$$\begin{aligned} a\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} + b\begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix} &= \begin{bmatrix} 4 & 1 \\ 0 & -3 \end{bmatrix} \\ \begin{bmatrix} 1 & 0 \\ 0 & a \end{bmatrix} + \begin{bmatrix} b & 0 \\ 0 & 0 \end{bmatrix} &= \begin{bmatrix} 4 & 1 \\ 0 & -3 \end{bmatrix} \\ \begin{bmatrix} a + b & 0 \\ 0 & a \end{bmatrix} &= \begin{bmatrix} 4 & 1 \\ 0 & -3 \end{bmatrix} \end{aligned}$$

   Looking at the (2,2) entry we say that $0 = 1$, which of course is impossible. Thus there is no solution for a and b