13 July, 2011
Math 1107, Section A

TEST 3

1. Find the determinant of [10 marks]: $\begin{bmatrix} 2 & 4 & 0 & 10 \\ 2 & 2 & 6 & 4 \\ -1 & 0 & -1 & 1 \\ -2 & -3 & 5 & 7 \end{bmatrix}$

2. Find the inverse of the following [12 marks]:

   (a) $\begin{bmatrix} 1 & 3 \\ 7 & -1 \end{bmatrix}$

   (b) $\begin{bmatrix} 1 & 2 & -1 \\ 0 & 1 & 3 \\ 2 & 5 & 0 \end{bmatrix}$

3. For each of the following sets of vectors, determine which are **linearly dependent**, and which are **linearly independent** [12 marks]:

   (a) $\left\{ \begin{pmatrix} 1 \\ 0 \\ 3 \end{pmatrix}, \begin{pmatrix} 0 \\ -7 \\ 3 \end{pmatrix}, \begin{pmatrix} -2 \\ 1 \\ 0 \end{pmatrix} \right\}$

   (b) $\left\{ \begin{pmatrix} 2 \\ 1 \\ 4 \end{pmatrix}, \begin{pmatrix} -1 \\ 0 \\ 3 \end{pmatrix}, \begin{pmatrix} 3 \\ 1 \\ 1 \end{pmatrix} \right\}$

   (c) $\left\{ \begin{pmatrix} 1 \\ 0 \\ 3 \end{pmatrix}, \begin{pmatrix} -2 \\ 1 \\ 0 \end{pmatrix}, \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix} \right\}$

4. Consider the following system:

$$\begin{aligned} x + 5z &= -4 \\ 2x + y + 6z &= -1 \\ 3x + 4y &= 11 \end{aligned}$$

   Use the fact that the inverse of the coefficient matrix, A^{-1}, is given below, and solve the system without performing row operations [6 marks].

$$A^{-1} = \begin{bmatrix} -24 & 20 & -5 \\ 18 & -15 & 4 \\ 5 & -4 & 1 \end{bmatrix}$$