14 October, 2011
Math 1104, Section B

TEST 2

1. Put the following system of equations into an augmented matrix and perform row operations to get the matrix into **Row Reduced Echelon Form**. Give your answer as $x = ...$, $y = ...$, $z = ...$ Marks will be deducted if you leave your solution in matrix form!

   IF the system is inconsistent, it is sufficient to only **Row Reduce**, and then clearly state your findings [22 marks].

   (a)

$$\begin{array}{rcl} 2x + 3y - z & = & 4 \\ x + y + z & = & 3 \\ y - 2z & = & -1 \end{array}$$

   (b)

$$\begin{array}{rcl} x_1 + 2x_2 + x_3 - 3x_4 & = & 2 \\ 2x_1 + 6x_2 + 3x_3 - x_4 & = & 1 \\ -x_1 + x_2 + 2x_4 & = & 1 \\ x_1 + x_2 + x_3 + 3x_4 & = & 4 \end{array}$$

   (c)

$$\begin{array}{rcl} x_1 + 2x_2 - 3x_3 + 2x_4 & = & 1 \\ -3x_1 - 6x_2 + 2x_3 - x_4 & = & -2 \\ x_2 + 2x_3 + x_4 & = & -1 \\ -x_1 - x_2 - 2x_3 + 4x_4 & = & -1 \end{array}$$

2. Let $A = \begin{bmatrix} 2 & 3 & -1 \\ 1 & 1 & 1 \\ 0 & 1 & 2 \end{bmatrix}$, $\vec{b} = \begin{pmatrix} 1 \\ -1 \\ 2 \end{pmatrix}$, $\vec{0} = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$, and $\vec{x} = \begin{pmatrix} x \\ y \\ z \end{pmatrix}$ [8 marks].

   (a) Write out the augmented matrix which represents the system of linear equations:

$$(A - \lambda I)\vec{x} = \vec{b}$$

   (b) Rewrite the augmented matrix derived in (2a) with:

   i. $\vec{b} = \vec{0}$, $\lambda = 1$.
   ii. $\vec{b} = \vec{0}$, $\lambda = 2$.