Math1204 Test 1

January 18$^{\text{th}}$, 2012

Answer all questions and give complete reasons and checks for your answers. Please do not erase anything, just put a line through your work and continue; you cannot lose marks for anything you write. The parts of the questions are weighted as shown and can be answered in any order.

1. (a) Find both a particular solution and a homogeneous solution for this augmented matrix by using row operations on it. [7]

$$\begin{pmatrix} 6 & 9 & 3 & | & -3 \\ 6 & 5 & 7 & | & 1 \\ 7 & 5 & 9 & | & 2 \end{pmatrix}$$

   (b) Why couldn't there be two homogeneous solutions which aren't multiples of each other for the matrix on the left of the dotted line in part (a)? Find by experimentation or algebra an augmented matrix system of the same size which has these two different homogeneous solutions: $\begin{pmatrix} 3 \\ -2 \\ 1 \end{pmatrix}$ and $\begin{pmatrix} 5 \\ 0 \\ 1 \end{pmatrix}$ [3]

2. Use row operations on the underlying matrix to get this system of equations to an equivalent of reduced row echelon form and hence find its unique integer solution. [10]

$$\begin{aligned} 4\,w + 2\,x - 4\,y + 3\,z &= 9 \\ 3\,w + 2\,x + z &= -5 \\ w - 3\,y - 2\,z &= -8 \\ 4\,w + 3\,x + y + 3\,z &= 0 \end{aligned}$$