## MA 1111: Linear Algebra I Tutorial problems, October 2, 2014

**1.** For the system of linear equations

$$\begin{cases} 3x + y + z = 1, \\ x + 3y + z = 1, \\ x + y + 3z = 1, \end{cases}$$

(a) write down the matrix corresponding to this system; (b) compute the reduced row echelon form for that matrix, and (c) use the reduced row echelon form obtained to solve this system of equations.

**2.** (a) Explain why the matrix

$$A = \begin{pmatrix} 1 & 1 & 2 & 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 2 & 3 \\ 0 & 0 & 0 & 0 & 0 & 1 & 1 \end{pmatrix}$$

is not a in reduced row echelon form.

(b) Bring A to its reduced row echelon form by elementary row operations.

(c) Write down the system of linear equations corresponding to the matrix A, and the equivalent system corresponding to the reduced row echelon form that you computed.

(d) Which of the unknowns are pivotal (principal) for this system of equations, and which are free? Describe the solution set to this system.

**3.** The system of equations

$$\begin{cases} 2x - y + 4z = 1, \\ 7x + 2y + z = 5 \end{cases}$$

defines a line  $\ell$  in the 3D space (which is the intersection of the corresponding planes). Find a parametric equation of that line. (*Hint*: for the parameter t of the line, one can take the (only) free unknown of this system of equations).