FURTHER MATHEMATICAL TECHNIQUES (MA10193)
EXAMPLES SHEET 2

I, or somebody, will look at work given to me at the end of the examples class at 12:15 on Wednesday, 9th March, or left before then in the folder on my office door (1W3.35). If you do not have a copy of this sheet, you can find one at
`http://www.bath.ac.uk/~masgks/MA10193/sheet1.ps` *(or* `.dvi` *or* `.pdf`*).*

1. Solve the following set of simultaneous equations using elementary row operations:

$$x + 2y - 8z = 0$$
$$2x - 3y + 5z = 0$$
$$3x + 2y - 12z = 0$$

2. Use the method of Gauss-Jordan elimination to solve the following set of simultaneous equations:

$$9x + 4y + 3z = -1$$
$$5x + y + 2z = 1$$
$$7x + 3y + 4z = 1$$

3. Use elementary row transformations to find the solution to the following simultaneous equations in the case where $a_{11}a_{22} - a_{12}a_{21} \neq 0$.

$$a_{11}x_1 + a_{12}x_2 = b_1$$
$$a_{21}x_1 + a_{22}x_2 = b_2$$

4. Find the rank of A where

$$A = \begin{pmatrix} 0 & 2 & -1 \\ 1 & 0 & 3 \\ 2 & -4 & 2 \end{pmatrix}.$$

Hence (without solving the system) state how many solutions, if any, the following linear system has:

$$2y - z = 1$$
$$x + 3z = 3$$
$$2x - 4y + 2z = -7$$

5. Solve the equation (remember that $\det A$ or $|A|$ means the determinant of A)

$$\begin{vmatrix} x+1 & x & x-4 \\ 2 & 1 & -4 \\ 3 & 5 & 1 \end{vmatrix} = 0$$

6. Consider the matrix

$$A = \begin{pmatrix} -1 & 3 & x \\ -2 & 2 & 1 \\ x & 4 & 0 \end{pmatrix}.$$

Calculate $\det A$ in terms of x and hence determine those values of x (to 2 d.p.) for which the matrix has rank less than 3. If $x = 2$ write down the rank of A.

GKS, 2/03/05