MA552. Homework 1

Homework due September 5, 2006

1. Any plane in the Cartesian coordinate system $OXYZ$ can be presented as a first degree equation with respect to variables x, y, z:

   (1)
   $$Ax + By + Cz + D = 0$$

   where $A^2 + B^2 + C^2 \neq 0$. And, also, any equation of the form 1 determines some plane. Find an equation of the form 1 for a plane which is

   (a) parallel to plane OXY and includes point $a = (1, -1, 2)$

   (b) parallel to OX axis and includes points $a = (7, 2 - 3)$ and $b = (5, 6, -4)$

2. Use Gaussian elimination to solve the following system (Hint: use matrix notation)

   (2)
   $$\begin{cases} 5x_1 + x_2 - 3x_3 = -6 \\ 2x_1 - 5x_2 + 7x_3 = 9 \\ 4x_1 + 2x_2 - 4x_3 = -7 \\ 5x_1 - 2x_2 + 2x_3 = 1 \end{cases}$$

3. Compute the products AB and BA when it is possible, and explain if it is impossible:

   (a)
   $$A = \begin{pmatrix} -1 & 1 & 1 \\ 1 & 0 & 1 \\ 0 & 1 & -1 \end{pmatrix}$$

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

   (b)
   $$A = \begin{pmatrix} 1 & 2 \\ 3 & 1 \end{pmatrix}$$

   $$B = \begin{pmatrix} -1 & 3 \\ 1 & 1 \end{pmatrix}$$