Quiz #6 (CSE 400.001)

November 23, 2011 (Wednesday)

1. (6 points) It is impossible for a system of linear equations to have exactly two or exactly three solutions. Explain why by answering the following three questions:

   (a) (2 points) If (x_1, y_1, z_1) and (x_2, y_2, z_2) are two different solutions, what is another one?

   (b) (2 points) If (x_1, y_1, z_1), (x_2, y_2, z_2), and (x_3, y_3, z_3) are three different solutions, what is another one?

   (c) (2 points) If 25 planes meet at three different points, where else do they meet?

   Solution:

   (a) (2 points) Any point on the line passing through the two points.

   (b) (2 points) Any point on the line/plane determined by the three points

   (c) (2 points) On a line/plane determined by the three points.

2. (8 points) Which rows or columns or matrices do you multiply to find

   (a) (2 points) the entry in row 3, column 4 of AB?

   (b) (2 points) the third column of AB?

   (c) (4 points) the entry in row 1, column 1 of CDE?

   Solution:

   (a) (2 points) The third row of A and the fourth column of B

   (b) (2 points) A and the third column of B

   (c) (2 points) The first row of C, D, and the first column of E

3. (6 points) Which numbers a and b lead to row exchange? Which make the matrix singular?

$$A = \begin{bmatrix} 1 & 2 & 3 \\ a & 6 & 3 \\ 0 & b & 6 \end{bmatrix}$$

   Solution:

$$E_{21}A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 6-2a & 3-3a \\ 0 & b & 6 \end{bmatrix}$$

   $a = 3$ and $b \neq 0$ lead to rwo exchange. The numbers with $ab - 4a - b + 12 = 0$ make the matrix singular.