Dawson College: Linear Algebra: 201-NYC-05-S07: Winter 2010

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Quiz 1

This quiz is graded out of 10 marks. No books, calculators, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

Question 1. *(2 marks)* Is $x_1x_2 + 2x_3 + x_4 = 2$ a linear equation, justify.

No, since two variables are multiplied together.

Question 2. *(2 marks)* Find the coefficient matrix and augmented matrix of the following system of linear equations.

$$\begin{array}{rcrcrcl} 3x_1 & & & + & 2x_3 & = & -2 \\ 4x_1 & + & x_2 & & & = & 0 \\ & & -x_2 & + & x_3 & = & 1 \end{array}$$

Coeff. matrix $\begin{bmatrix} 3 & 0 & 2 \\ 4 & 1 & 0 \\ 0 & -1 & 1 \end{bmatrix}$

augmented matrix $\begin{bmatrix} 3 & 0 & 2 & -2 \\ 4 & 1 & 0 & 0 \\ 0 & -1 & 1 & 1 \end{bmatrix}$

Question 3. *(1 mark)* Find the system of linear equations corresponding to the augmented matrix.

$$\begin{bmatrix} 1 & 2 & 0 & 0 \\ -1 & 0 & 2 & 2 \\ 0 & 2 & -1 & -3 \end{bmatrix}$$

$$\begin{aligned} x_1 + 2x_2 &= 0 \\ -x_1 + 2x_3 &= 2 \\ 2x_2 - x_3 &= -3 \end{aligned}$$

Question 4. *(3 marks)* Is the following matrix under row echelon form, justify.

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 2 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

yes, since
- first non-zero entry of each row is '1'.
- row of zeros at bottom of matrix
- leading '1' to the right of the one above.

Question 5. *(2 marks)* Is the following matrix under reduced row echelon form, justify.

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 1 & -1 \end{bmatrix}$$

NO, since the row of zeros is not at the bottom.