

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 $x_2 + 2x_3 + x_4 = 2 - x_1$ a linear equation, justify.

yes, since $x_1 + x_2 + 2x_3 + x_4 = 2$ has the form

$$a_1x_1 + a_2x_2 + \dots + a_{n-1}x_{n-1} + a_nx_n = b$$

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

$$\begin{array}{rcl} x_1 & + & 2x_3 = 0 \\ -2x_1 & - & x_3 = 2 \\ x_1 & - & 3x_2 + 4x_3 = -11 \end{array}$$

augmented matrix: $\begin{bmatrix} 1 & 0 & 2 & 0 \\ -2 & 0 & -1 & 2 \\ 1 & -3 & 4 & -11 \end{bmatrix}$

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

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

$$\begin{bmatrix} 2 & 0 & 2 & 1 \\ -1 & 0 & 2 & 2 \\ -5 & 4 & -1 & -5 \end{bmatrix} \quad \begin{array}{l} 2x_1 + 2x_3 = 1 \\ -x_1 + 2x_3 = 2 \\ -5x_1 + 4x_2 - x_3 = -5 \end{array}$$

Question 4. (2 marks) Is the following matrix under row echelon form, justify.

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 2 \\ 0 & 0 & 1 & 0 \end{bmatrix} \quad \text{no, since the leading '1' in the 3rd row is not to the right of the one above.}$$

Question 5. (3 marks) Is the following matrix under reduced row echelon form, justify.

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 2 \\ 0 & 0 & 0 \end{bmatrix} \quad \text{yes, since:}$$

- row of zeros at bottom.
- first non-zero entry a leading '1'
- leading '1' to the right of the above leading '1'
- leading '1' only entry in their column.