

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. §1.1 #1b (1 mark) Determine whether the equation is linear in x_1 , x_2 , and x_3 :

$$x_1 + 3x_2 + x_1x_3 = 2$$

Not a linear equation since two variables are multiplied

Question 2. §1.1 #2d (1 mark) Determine whether the equations form a linear system.

$$\begin{aligned} 3z + x &= -4 \\ y + 5z &= 1 \\ 6x + 2z &= 3 \\ -x - y - z &= 4 \end{aligned}$$

They form a linear system.

Question 3. §1.1 #11b (2 marks) Find a system of linear equations corresponding to the given augmented matrix.

$$\left[\begin{array}{cccc} 3 & 0 & -2 & 5 \\ 7 & 1 & 4 & -3 \\ 0 & -2 & 1 & 7 \end{array} \right]$$

$$\begin{aligned} 3x_1 - 2x_3 &= 5 \\ 7x_1 + x_2 + 4x_3 &= -3 \\ -2x_2 + x_3 &= 7 \end{aligned}$$

Question 3. §1.1 #14c (2 marks) Find the augmented matrix for the given system of linear equations

$$\begin{aligned} x_1 + 2x_2 - x_4 + x_5 &= 1 \\ 3x_2 + x_3 - x_5 &= 2 \\ x_3 + 7x_4 &= 1 \end{aligned} \quad \left[\begin{array}{ccccc|c} 1 & 2 & 0 & -1 & 1 & 1 \\ 0 & 3 & 1 & 0 & -1 & 2 \\ 0 & 0 & 1 & 7 & 0 & 1 \end{array} \right]$$

Question 4. §1.1 #8 (2 marks) Determine whether the given vector $(3, 1, 1)$ is a solution of the linear system

$$\begin{aligned} 2x_1 - 4x_2 - x_3 &= 1 & 2(3) - 4(1) - 1 &= 1 \quad \checkmark \\ x_1 - 3x_2 + x_3 &= 1 & 3 - 3(1) + 1 &= 1 \quad \checkmark \\ 3x_1 - 5x_2 - 3x_3 &= 1 & 3(3) - 5(1) - 3(1) &= 1 \quad \checkmark \end{aligned} \quad \begin{array}{l} \therefore \text{is a solution since the} \\ \text{vector satisfies all three} \\ \text{linear equations} \end{array}$$

Question 5. §1.1 #10a (2 marks) Find the solution set of the linear equation by using parameters as necessary

$$3x_1 - 5x_2 + 4x_3 = 7$$

$$\text{Let } \begin{array}{l} x_2 = s \\ x_3 = t \end{array} \quad s, t \in \mathbb{R}$$

$$\begin{aligned} \text{So } 3x_1 - 5s + 4t &= 7 \\ x_1 &= \frac{7 + 5s - 4t}{3} \end{aligned}$$

\therefore the solution set is

$$(x_1, x_2, x_3) = \left(\frac{7 + 5s - 4t}{3}, s, t \right)$$