

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 #6 Write a system of linear equations consisting of three equations in three unknowns with

- a. (1 mark) no solutions.
 b. (1 mark) exactly one solution.
 c. (1 mark) infinitely many solutions.

$$\begin{aligned} \text{a) } & x + y + z = 0 \\ & x + y + z = 1 \\ & x + y + z = 2 \end{aligned}$$

$$\begin{aligned} \text{b) } & x + 0y + 0z = 0 \\ & 0x + y + 0z = 0 \\ & 0x + 0y + z = 0 \end{aligned}$$

$$\begin{aligned} \text{c) } & x + y + z = 1 \\ & 2x + 2y + 2z = 2 \\ & 3x + 3y + 3z = 3 \end{aligned}$$

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

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

$$\begin{aligned} & x - 2z = 5 \\ 7x + y + 4z & = -3 \\ -2y + z & = 7 \end{aligned}$$

Question 3. §1.1 #14c (1 mark) Find the augmented matrix for the given system of linear equations

$$\begin{aligned} x_1 + 2x_2 - x_4 + x_5 &= 1 \\ 3x_2 + x_3 - x_5 &= 2 \\ x_3 + 7x_4 &= 1 \end{aligned}$$

$$\left[\begin{array}{ccccc|c} 1 & 2 & 0 & -1 & 1 & 1 \\ 0 & 3 & 1 & 0 & -1 & 2 \\ 0 & 0 & 1 & 7 & 0 & 1 \end{array} \right]$$

Question 4. §1.1 #7b (2 marks) Determine whether the given vector $(3, -1, 1)$ is a solution of the linear system

$$\begin{aligned} 2x_1 - 4x_2 - x_3 &= 1 \\ x_1 - 3x_2 + x_3 &= 1 \\ 3x_1 - 5x_2 - 3x_3 &= 1 \end{aligned}$$

sub $(3, -1, 1)$ into the system

$$2(3) - 4(-1) - (1) \stackrel{?}{=} 1$$

$9 \neq 1$ \therefore not a solution since it does not satisfy the first eqn.

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

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

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

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

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

$s, t \in \mathbb{R}$