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

$\pi x_1 - \sqrt{2}x_2 + \frac{1}{3}x_3 = 7^{1/3}$ Linear, since it has the form $ax_1 + bx_2 + cx_3 = d$

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

$$\begin{array}{rcrcrcl} -2x & + & 4y & + & z & = & 2 \\ 3x & - & \frac{2}{y} & & & = & 0 \end{array}$$

Not linear, since second equation has the non-linear term $\frac{2}{y}$.

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

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

$2x = 0$
$3x - 4y = 0$
$y = 1$

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

$$\begin{array}{rcrcrcl} 2x_1 & & & + & 2x_3 & = & 1 \\ 3x_1 & - & x_2 & + & 4x_3 & = & 7 \\ 6x_1 & + & x_2 & - & x_3 & = & 0 \end{array}$$

$$\begin{bmatrix} 2 & 0 & 2 & 1 \\ 3 & -1 & 4 & 7 \\ 6 & 1 & -1 & 0 \end{bmatrix}$$

Question 4. §1.1 #10b *(2 marks)* Find the solution set of the linear equation by using parameters as necessary

$3v - 8w + 2x - y + 4z = 0$

Let $w = s$, $x = t$, $y = r$, $z = q$ $\quad s,t,r,q \in \mathbb{R}$

$\therefore (v, w, x, y, z) = \left(\frac{8s - 2t + r - 4q}{3}, s, t, r, q\right)$

So $3v - 8s + 2t - r + 4q = 0$ $\quad s,t,r,q \in \mathbb{R}$

$v = \frac{8s - 2t + r - 4q}{3}$

Question 5. §1.1 #TFe *(2 marks)* Determine whether the statement is true or false, and justify your answer.
If the number of equations in a linear system exceeds the number of unknowns, then the system must be inconsistent.

False, $x + y = 1$, $2x + 2y = 2$, $3x + 3y = 3$ is consistent since $x = 0$ and $y = 1$ is a solution to the system.