# Math 1553 J1-J4 Quiz: Lines and Planes 

Solutions

The quiz has a total of 12 points and you have 10 minutes. Read carefully.

1. [1 point each] Which of the following are linear equations in $x, y, z$ ?
(1) $x=0$
(2) $x y=\sqrt{\pi}$
(3) $\sqrt{2} x+z=4$

## Solution.

(1) Yes.
(2) No. The variables cannot multiply each other
(3) Yes. The square root is only a coefficient of $x$
2. [3 points each] For each of the following systems, provide a solution (if it exists) and determine whether this solution is unique.
(1) $\begin{array}{r}2 x+y=7 \\ x-y=2\end{array}$
(2) $\begin{aligned} & 2 x+2 y=6 \\ & 3 x+3 y=9\end{aligned}$

## Solution.

(1) Intersection at $(3,1)$, solution is unique.
(2) Intersection at, e.g., (1,2), solution is not unique. (Because, e.g., the point $(2,1)$ also satisfies both equations; or because both equations represent the same line)
2 points for giving a valid intersection and 1 point for stating weather the solution is unique or not.

## Name:

3. [3 points] Translate the following system of equations into an (augmented) matrix. Is this in echelon form? Justify your answer

$$
\begin{array}{r}
x_{1}+x_{2}+x_{4}=7 \\
3 x_{2}+x_{3}=-2 \\
-x_{3}+3 x_{4}=4 \\
-x_{2}+2 x_{3}=0
\end{array}
$$

## Solution.

The augmented matrix is

$$
\left(\begin{array}{rrrr|r}
1 & 1 & 0 & 1 & 7 \\
0 & 3 & 1 & 0 & -2 \\
0 & 0 & -1 & 3 & 4 \\
0 & -1 & 2 & 0 & 0
\end{array}\right)
$$

It is not in echelon form because there is a pivot in the second column but the second entry of the last row there is not zero.

One point for each of the following:

- writing down the matrix,
- stating it is not in echelon form
- explaining their reasoning

