1. Give an example of a point in $\mathbb{R}^4$.

$$\left( \pi, \ e, \ \sqrt{2}, \ 0 \right)$$

2. Which of the following equations are linear in $x$, $y$, and $z$? Select all that apply.

(a) $x = 0$

(b) $\pi x - 7y + \sqrt{2}z = e$

(c) $xyz = 1$

(d) $x^2 + y^2 + z^2 = 1$

3. Consider the following system of equations:

$$x - y - z = 1$$
$$x + y + z = 5$$

Which of the following are solutions to the system? Select all that apply.

(a) $(0, 0, 0)$

(b) $(3, 1, 1)$

(c) $(5, 2, 2)$

Turn the page over!
4. Suppose I have two equations in three variables. Which of the following are possible solutions to the system?

(a) the empty set
(b) a single point
(c) a line
(d) a plane
(e) $\mathbb{R}^3$

5. Consider the following system of equations:

\[
\begin{align*}
  x - y &= 0 \\
  x - y &= h
\end{align*}
\]

For which values of $h$ does this system of equations have a solution?

\[h = 0\]

For $h \neq 0$ the lines are parallel and different.