Please write your name and section number at the top.

**True or False - 2 points each**

1. If the columns of a matrix $A$ span $\mathbb{R}^m$, then the equation $Ax = b$ has a solution for every $b \in \mathbb{R}^m$.
2. If $v \in \text{Span}\{u_1, u_2, u_3\}$ and $v$ is not a scalar multiple of $u_3$, then $v \in \text{Span}\{u_1, u_2\}$.
3. If an $m \times n$ matrix does not have a pivot in every column, then its columns do not span $\mathbb{R}^m$.
4. The line $x + 2y = 1$ in $\mathbb{R}^2$ represents the solution set of a system whose augmented matrix is

$$
\begin{bmatrix}
1 & 1 & 1 \\
2 & 2 & 2
\end{bmatrix}
$$

For the remaining two points, solve the following system, writing the solution as a vector (or sum of vectors, according to your taste):

$$
\begin{align*}
x + 2y - 3z &= 4 \\
3x + y - 4z &= 2 \\
x - y &= -2
\end{align*}
$$

$$
\begin{bmatrix}
x \\
y \\
z
\end{bmatrix} =
$$