

Name: _____

- Put your name in the “_____” above.
- Answer all questions.
- Proofs are graded for correctness, clarity, rigor, neatness.
- Good luck!

1. Write down an equation for a line which

- passes through the point $(1, 2, 3)$ and
- is perpendicular to the vector $\begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$.

Solution. One vector that is perpendicular to $\begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$ is the vector $\begin{bmatrix} 1 \\ -1 \\ 0 \end{bmatrix}$, so one line that satisfies the requirements of the question is

$$L = \left\{ \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} + \begin{bmatrix} 1 \\ -1 \\ 0 \end{bmatrix} t \mid t \in \mathbb{R} \right\}.$$

There are many other options though!

□