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MA 26500 Quiz 4

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1. (12 points) List all the properties a set V must satisfy in order to be a vector space.

   (*Hint:* there are eight of them.)

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2. Which of the following subsets W of $\mathbb{R}^3$ are subspaces?

   (a) (2 points) $W = \left\{ \begin{bmatrix} x \\ y \\ z \end{bmatrix} : x \leq y \leq z \right\}$.

   (b) (2 points) $W = \left\{ \begin{bmatrix} x \\ y \\ z \end{bmatrix} : x + y + z = 0 \right\}$.

   (c) (2 points) $W = \left\{ \begin{bmatrix} x \\ y \\ z \end{bmatrix} : x^2 + y^2 + z^2 = 1 \right\}$.

   (d) (2 points) $W = \left\{ \begin{bmatrix} x+2y+3z \\ z \\ 0 \end{bmatrix} : x, y, z \in \mathbb{R} \right\}$.

   (By now you should have a feel of what a vector spaces is so you do not need to check all of the conditions; but for those that are not subspaces, give me a reason, e.g., the set is not closed under addition, multiplication by scalars, etc.)