

Circle the name of your instructor:

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STUDENT'S NAME: _____ ID #: _____

DEPARTMENT OF MATHEMATICS & STATISTICS

MATH 1503

MID-TERM TEST

WEDNESDAY, Novemeber 9, 2011

No calculators, notes or other study aids permitted.

MARKS

1. Give an example of a system of 3 equations, each representing a plane in \mathbb{R}^3 , whose solution uses exactly one parameter.
2. Using either Gaussian or Gauss Jordan Elimination, find the solutions to the systems of equations that have the following augmented matrices. (Use the variables x, y, z for (a) and (b), and x, y, z, w for (c)).

() (a)
$$\left[\begin{array}{ccc|c} 1 & 0 & 1 & 2 \\ 0 & 1 & 0 & 2 \\ 2 & 0 & 3 & 5 \end{array} \right]$$

() (b)
$$\left[\begin{array}{ccc|c} 1 & 1 & 1 & 0 \\ 1 & 2 & 3 & 1 \\ 2 & 3 & 4 & -1 \end{array} \right]$$

() (c)
$$\left[\begin{array}{cccc|c} 1 & 1 & 0 & -1 & -1 \\ 0 & 1 & -2 & 4 & 2 \\ 0 & 0 & 0 & 1 & 0 \end{array} \right]$$

3. Let $\vec{v} = \begin{bmatrix} 2 \\ 2 \\ 1 \end{bmatrix}$ and $\vec{w} = \begin{bmatrix} 0 \\ 2 \\ -4 \end{bmatrix}$.

() (a) Justify: $\begin{bmatrix} 2 \\ 4 \\ -3 \end{bmatrix}$ is in $\text{span}(\vec{v}, \vec{w})$.

() (b) Justify: $\begin{bmatrix} 2 \\ 0 \\ 0 \end{bmatrix}$ is not in $\text{span}(\vec{v}, \vec{w})$.

(c) Justify: \vec{v} and \vec{w} are linearly independent vectors.

() 4. Give an example of 2 different vectors \vec{v}, \vec{w} in \mathbb{R}^2 such that $\mathbb{R}^2 \neq \text{span}(\vec{v}, \vec{w})$.

5. Consider the two lines in \mathbb{R}^3 given by the vector equations:
 $\langle x, y, z \rangle = \langle 0, 2, 8 \rangle + t \langle -1, 0, 5 \rangle$ and $\langle x, y, z \rangle = \langle -1, 3, 4 \rangle + s \langle 2, -1, -7 \rangle$. Show that the lines intersect by finding the point of intersection.