Math 110 Fall 2019 - Quiz 3 – BANK

date - time **Name:**

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(1) Give a basis for the subspace of $V = \mathbb{R}^3$ that satisfies the equations,

$$2x - y = 0$$

$$x + y - z = 0$$

(2) What conditions must be placed on a, b, c, d, e and f such that the subset,

$$S = \left\{ \begin{pmatrix} a \\ b \\ c \end{pmatrix}, \begin{pmatrix} d \\ e \\ f \end{pmatrix} \right\} \subset \mathbb{R}^3$$

is linearly independent?

(3) Prove that two perpendicular vectors in $\mathbb{R}^2$ form a linearly independent set.

(4) Let A be a 3×3 skew symmetric matrix, that is $A^T = -A$. Prove or disprove: the columns of A form a linearly independent set.

(5) Let $S = \{s_1, \ldots, s_n\}$ and $T = \{t_1, \ldots, t_m\}$ be linearly independent subsets of a vector space V. Prove or disprove: The set $\{s_1, \ldots, s_n, t_1, \ldots, t_m\}$ is linearly independent if and only if $\text{Span}(S) \cap \text{Span}(T) = \{\underline{0}\}$.

(6) Describe a vector space, V, with a basis that contains infinitely many elements. Give an example of a basis of V.