Math 24
Winter 2010
Monday, January 11, 2010

(1.) TRUE or FALSE?

a. The zero vector is a linear combination of any nonempty set of vectors.

b. The span of $\emptyset$ is $\emptyset$.

c. If S is a subset of a vector space V, then $span(S)$ equals the intersection of all subspaces of V that contain S.

d. If S is a nonempty subset of a vector space V, then $span(S)$ equals the set of all linear combinations of elements of S.

e. In solving a system of linear equations, it is permissible to multiply an equation by any constant.

f. In solving a system of linear equations, it is permissible to add any multiple of one equation to another.

g. Every system of n equations in fewer than n variables has a solution.

h. If X and Y are two subsets of a vector space V, then

$$X \subseteq Y \implies span(X) \subseteq span(Y).$$

i. If X and Y are two subsets of a vector space V, then

$$X \cap Y = \emptyset \implies span(X) \cap span(Y) = \{0\}.$$

j. Every system of homogeneous linear equations has a solution. (A linear equation $a_1x_1 + a_2x_2 + \cdots a_nx_n = b$ is *homogeneous* if and only if $b = 0$.)

(2.) Determine whether $(1, 2, 3)$ is in the span of the set $\{(2, 4, -1),\ (3, 0, 5)\}$ in $\mathbb{R}^3$.

(3.) The span of $\{(2, 4, -1),\ (3, 0, 5)\}$ in $\mathbb{R}^3$ is a plane. Find an equation for this plane in the form $ax + by + cz = d$.