Math 24
Spring 2012

Quiz

Monday, April 9

Sample Solutions

1. Complete the sentence: If S is a subset of a vector space V, and one of the vectors in S can be written as a linear combination of other vectors in S, then S must be

   > linearly dependent.

2. Explain how we can tell immediately that

   $$\{(2,3,1,0), (-1,1,.5,2), (3,3,6,6), (2,1,6,7), (5,-5,0,0)\}$$

   is not a linearly independent subset of $\mathbb{R}^4$.

   > There are more than 4 vectors in the subset, and $\mathbb{R}^4$ has dimension 4.

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   The subspace W of $M_{2\times 2}(\mathbb{R})$ consists of all matrices $\begin{pmatrix} x & y \\ z & w \end{pmatrix}$ whose entries satisfy a system of linear equations that can be converted by Gaussian elimination to the system

   $$x + 3y - 3w = 0$$
   $$-z + 2w = 0.$$

3. Give the general solution to this system. (This probably involves using parameters.)

   $x = \boxed{-3s + 3t}$

   $y = \boxed{s}$

   $z = \boxed{2t}$

   $w = \boxed{t}$

4. Write down a basis for W.

   $$\boxed{\left\{\begin{pmatrix} -3 & 1 \\ 0 & 0 \end{pmatrix}, \begin{pmatrix} 3 & 0 \\ 2 & 1 \end{pmatrix}\right\}}$$