ICS 6N **Friday, November 15, 2013**

Quiz 5

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1. Below are three matrices. Matrix M is a row echelon form of matrix A. Matrix A^{-1} is the inverse of matrix A.

$$A = \begin{bmatrix} 1 & 3 & 1 \\ 1 & 1 & 2 \\ 2 & 3 & 4 \end{bmatrix} \qquad M = \begin{bmatrix} 1 & 3 & 1 \\ 0 & -2 & 1 \\ 0 & 0 & 1 \end{bmatrix} \qquad A^{-1} = \begin{bmatrix} 2 & 9 & -5 \\ 0 & -2 & 1 \\ -1 & -3 & 2 \end{bmatrix}$$

Use this information to find the coordinate vector $[\vec{x}]_{\mathcal{B}}$ of $\vec{x}$ relative to basis $\mathcal{B}$. $\mathcal{B}$ and $\vec{x}$ are defined as follows:

$$\mathcal{B} = \left\{ \begin{bmatrix} 1 \\ 1 \\ 2 \end{bmatrix}, \begin{bmatrix} 3 \\ 1 \\ 3 \end{bmatrix}, \begin{bmatrix} 1 \\ 2 \\ 4 \end{bmatrix} \right\} \qquad \vec{x} = \begin{bmatrix} 2 \\ -2 \\ -1 \end{bmatrix}$$

(Caution: not all of the information given is relevant to the problem.)

2. Indicate whether the following statements are true or false:

   (a) The number of pivot columns of a matrix equals the dimension of its column space.

   (b) A plane in $\mathbb{R}^3$ is a two-dimensoinal subspace of $\mathbb{R}^3$.

   (c) The dimension of the vector space $\mathbb{P}_4$ is 4. (Recall that $\mathbb{P}_4$ is the set of all polynomials with degree at most 4).

   (d) If the dimension of V is n and S is a linearly indepdendent set in V, then S is a basis for V.

   (e) If a set $\{\vec{v}_1, \vec{v}_2, \ldots, \vec{v}_p\}$ spans a finite-dimensional vector space V and T is a set of more than p vectors, then T is linearly dependent.