Quiz 5

Math 54 Linear Algebra and DE with Professor Voiculescu

Tuesday, 6 March 2014

Name: _____

Problem 1. (*10 points*) Let $A = \begin{bmatrix} 1 & -4 & 9 & -7 \\ -1 & 2 & -4 & 1 \\ 5 & -6 & 10 & 7 \end{bmatrix}$.

(a) (*2 points*) Determine the rank A and the dim Row A.

(b) (*8 points*) Find the bases for Col A and Row A.

Problem 2. (*4 points*) The set $\mathcal{B} = \{1 - t^2, t - t^2, 2 - t + t^2\}$ is a basis for $\mathbb{P}_2$. Find the coordinate vector of $\mathbf{p}(t) = 1 + 3t - 6t^2$ relative to $\mathcal{B}$.

Problem 3. (*6 points*) True or False. Provide a justification or a counter-example.

(a) $\mathbb{P}_2$ and $\mathbb{R}_3$ are isomorphic, i.e. there exists an isomorphism between the two spaces.

(b) Let W be a vector space spanned by the set $\mathcal{B} = \{\mathbf{b}_1, \mathbf{b}_2, \mathbf{b}_3\}$. Then for all $\mathbf{x} \in W$, there exists a unique set of scalars c_1, c_2, c_3 such that $\mathbf{x} = c_1\mathbf{b}_1 + c_2\mathbf{b}_2 + c_3\mathbf{b}_3$.

(c) Let A be an $m \times n$ matrix. Rank A^T+Nullity A=n