Linear Algebra. Homework Set # 9 Due 3/26/08 Name:_____

1. #14 §4.4, p.254 : The set $\beta = \{1 - t^2, t - t^2, 2 - 2t + t^2\}$ is a basis for $\mathbf{P}_2$. Find the coordinate vector of $\mathbf{p}(t) = 3 + t - 6t^2$.

2. #32, §4.4, p.255 : Let $\mathbf{p}_1(t) = 1 + t^2$, $\mathbf{p}_2(t) = 2 - t + 3t^2$, $\mathbf{p}_3(t) = 1 + 2t - 4t^2$.
   (a) Use coordinate vectors to show that these polynomials form a basis for $\mathbf{P}_2$.
   (b) Consider the basis $\beta = \{\mathbf{p_1}, \mathbf{p}_2, \mathbf{p}_3\}$ for $\mathbf{P}_2$. Find $\mathbf{q}$ in $\mathbf{P}_2$ given that $[\mathbf{q}]_\beta = \begin{pmatrix} -3 \\ 1 \\ 2 \end{pmatrix}$.

3. #22, §4.5, p.261 : The first four Lguerre polynomials are 1, $1 - t$, $2 - 4t + t^2$, and $6 - 18t + 9t^2 - t^3$. Show that these polynomials form a basis of $\mathbf{P}_3$.

4. #24, §4.5, p.261 : Let β be a basis for $\mathbf{P}_2$ consisting of the first three Laguerre polynomials listed in problem 3, and let $\mathbf{p}(t) = 7 - 8t + 3t^2$. Find the coordinate vector of $\mathbf{p}$ realtive to β.

5. #6, §4.6, p.269 : If a 6×3 matrix A has rank 3, find dim Nul A, dim Row A, and rank A^T.