Last name: *First name:*

Recommended problems - *Please do NOT turn these in*:

- §5.4: 1, 5, 7a, 19, 27a.
- §5.5: 3c, 7b, 11a
- §5.6: 1, 5, l3, 17

Submitted problems: *Please turn these problems in*:

(1) Let $V = \{at^2 + (a+b)t + b\}$ be a subspace of P_2.
  (a) Find a basis for V. Determine the $dim(V)$.
  (b) Find the coordinate of given vector relative to the basis in part (a) if it is in V.
    (i) $p(t) = 3t^2 + 2t - 3$ (ii) $q(t) = 2t^2 + 3t + 1$.

(2) Find a basis for the vector space of all 3×3 symmetric matrices.

(3) Let $\{\mathbf{v_1}, \mathbf{v_2}, \mathbf{v_3}\}$ be a basis for vector space V. Prove that $\{\mathbf{v_1}, \mathbf{v_1} + \mathbf{v_2}, \mathbf{v_1} + \mathbf{v_2} + \mathbf{v_3}\}$ is also a basis for V.

(4) Let $A = \begin{bmatrix} 1 & 4 & 5 & 6 & 9 \\ 3 & -2 & 1 & 4 & -1 \\ -1 & 0 & -1 & -2 & -1 \\ 2 & 3 & 5 & 7 & 8 \end{bmatrix}$
  (a) Find bases for $row(A)$, $col(A)$, $null(A)$
  (b) Determine $rank(A)$ and $nullity(A)$. Verify the dimension theorem.

(5) If A is an $m \times n$ matrix, what are the largest possible value for its rank and the smallest possible value for its nullity?