1. (10 points) Let W be the set of vectors of the form (a, a^2, b). Show that W is not a subspace of $\mathbf{R}^3$.

2. (10 points) Solve the following system and express general solutions.

$$x_1 - x_2 + x_3 + 2x_4 = 0$$
$$x_1 \qquad - 3x_3 + 2x_4 = 0$$
$$2x_1 - x_2 - 2x_3 + 4x_4 = 0$$

3. (50 points) Give definition

    A.   Standard basis

    B.   Span

    C.   Linear independence

    D.   Basis

    E.   Dimension

4. (10 points) Find a basis for the subspace whose elements solve the following system

$$x_1 + x_2 - 7x_3 + 2x_4 + x_5 = 0$$
$$x_1 + 2x_2 - 10x_3 + 2x_4 + 2x_5 = 0$$
$$2x_1 + 3x_2 - 17x_3 + 4x_4 + 3x_5 = 0$$

5. (10 points) Determine whether the following sets of vectors are linear dependent or independent in $\mathbf{R}^3$. (a) {(1, 2, 0), (0, 1, -3), (1, 1, 2)}. (b) {(1, 2, 3), (-2, 0, 1), (4, -4, -9)}.

6. (10 points) Define dot product and show the commutative property