Assignment #4 ***Math 260*** ***Name:***

1. Prove / disprove if the following set is a vector space. Provide counter example for not a vector space.

a) $S=\left\{\begin{bmatrix} a & c \\ b & d \end{bmatrix} \middle| a+2b=c-3d\right\}$

b) $S=\left\{\begin{bmatrix} x \\ y \end{bmatrix} \in R^2 \middle| xy \geq 0\right\}$

c) $S=\left\{A \in M_2(R) \middle| \det(A)=0\right\}$

d) $S = \left\{ f(x) = ax^2 + bx + c \in P_2 \middle| f(0) + 2f'(0) = 0 \right\}$

e) $S = \left\{ A \in M_2(R) \middle| A = A^T \right\}$

2. Determine if S is a subspace of a vector space V.

a) $$S = \left\{ \begin{bmatrix} a \\ b \\ c \end{bmatrix} \in V = R^3 \,\middle|\, \int_0^1 \left(ax^2 + bx + c \right) dx = 0 \right\}$$

b) $$S = \left\{ A \in M_2\left(R\right) \middle| A^2 + A = I_2 \right\}$$

c) $$S = \left\{ \begin{bmatrix} a \\ b \\ c \end{bmatrix} \in R^3 \,\middle|\, a + 2b + 3c = 1 \right\}$$

d) All points on the unit circle: $S = \{(x, y) \in R^2 | x^2 + y^2 = 1\}$

e) $S = \{A \in M_3(R) | tr(A) = 0\}$

f) Set of all non – singular matrices: $S = \{A \in V = M_n(R) | \det(A) \neq 0\}$