



3. (10 points) Let  $V = \mathbb{R}^3$  and let  $W$  be the subset consisting of vectors  $\begin{pmatrix} x \\ y \\ z \end{pmatrix} \in \mathbb{R}^3$  such that  $x^2 + 2xy + y^2 = 0$ . Prove that  $W$  is a subspace, or find an example showing that it is not closed under addition or scalar multiplication.

4. (15 points) Do the following functions span the vector space of polynomials of degree  $\leq 2$ ?

$$1; 1 - x; 1 + 2x; x^2; x^3$$

5. Let  $\mathbf{B} = \begin{pmatrix} 2 & 1 & 0 & 3 \\ 4 & 1 & 1 & 1 \\ 2 & 3 & 0 & 3 \end{pmatrix}$ . The row echelon form of  $\mathbf{B}$  is  $\begin{pmatrix} 2 & 1 & 0 & 3 \\ 4 & 0 & 1 & 2 \\ 0 & 0 & 0 & 0 \end{pmatrix}$ .