

Q6 316

Work 2 of the 3 Problems. Clearly indicate which 2 are to be graded. *No notes, books, or calculators.*

- (1) Let P_2 denote the set of all polynomials of degree less than or equal to 2. Determine if the following sets H are a subspace of P_2 , and if so, determine a basis for H and the dimension of H .

(a) $H = \{p \in P_2 \mid p(1) = 0\}$

(b) $H = \{p \in P_2 \mid p(-t) = p(t)\}$

(c) $H = \{p \in P_2 \mid p'(t) = 2t\}$

(d) $H = \{p \in P_2 \mid \int_{-1}^1 tp(t) dt = 0\}$

- (2) Consider the parallelogram P determined by $u = (1, 1)^T$ and $v = (-1, 1)^T$.
- (a) Determine the area of P .

- (b) If $T : \mathbb{R}^2 \rightarrow \mathbb{R}^2$ has standard matrix $A = \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$, compute the area of the parallelogram $T(P)$.

- (3) Let $A = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix}$ and $b = \begin{bmatrix} 3 \\ 2 \\ 1 \end{bmatrix}$. Solve the system $Ax = b$ using Cramer's Rule.