

Let $A = \{1 + x^2, 1 - x^2 + x^4, 2 - x^2\}$ which spans a subspace of P_4 . Determine an orthogonal basis for the same subspace that A spans using the *Gram-Schmidt* procedure assuming the following inner product:

$$\text{If } p = a_0 + a_2x^2 + a_4x^4 \text{ and } q = b_0 + b_2x^2 + b_4x^4,$$

$$\text{define } \langle p, q \rangle = 2a_0b_0 + a_2b_2 + 2a_4b_4$$