APPLY GRAHAM - SCHMIDT ORTHOGONALIZATION TO

FIND 4TH DEGREE LEGENDRE POLYNOMIAL

$P_4(x)$

FIRST 3.

$$P_0(x) = 1, \quad P_1(x) = x, \quad P_2(x) = x^2 - \frac{1}{3}$$

$$P_3(x) = x^3 - \frac{3}{5}x$$

DERIVATION FROM CLASS:

SEQUENCE OF LINEARLY INDEPENDENT FUNCTIONS:

$$\{\Upsilon_0, \Upsilon_1, \Upsilon_2, \dots\}.$$

G-SCH ORTHO METHOD GIVES,

$$\{\Psi_0, \Psi_1, \Psi_2, \dots\}$$

MUTUALLY ORTHO FUNC'S

ORTHO JS? ...

GIVEN $\{1, x, x^2, x^3, \dots\}$ (LINRLY IND. FUNC.'S)

G-SCH GIVES POLYNOM'S

$$\{P_0(x), P_1(x), P_2(x), \dots\}$$

CALLED LEGENDRE POLYNOMIALS

$P_0(x) = 1$

$P_1(x) = x + \alpha_{10} \cdot P_0 \qquad | \cdot P_0$

WANT COEFFICIENT α_{10} SUCH THAT P_1, P_0
ARE ORTHOGONAL

$$\langle P_1, P_0 \rangle \equiv \emptyset$$
$$\equiv \langle x, P_0 \rangle + \alpha_{10} \overbrace{\langle P_0, P_0 \rangle}^{\|P_0\|^2}$$

$$\alpha_{10} = - \frac{\langle x, P_0 \rangle}{\|P_0\|^2}$$