

$$\begin{aligned} \langle x, p_0 \rangle &= \langle x, 1 \rangle = 0 \quad (p_0 = 1) \\ \|p_0\|^2 &= \langle p_0, p_0 \rangle = \int_{-1}^1 1 \cdot 1 \, dx = 2 \end{aligned} \quad \left. \begin{array}{l} \alpha_{10} = 0 \\ p_1 = x + 0 p_0 = x \end{array} \right\}$$

... NEXT

$$p_2 = x^2 + \alpha_{21} p_1 + \alpha_{20} p_0 \quad | \cdot p_0 \quad | \cdot p_1$$

SEEK  $\alpha_{21}, \alpha_{20}$  SO  
 $p_1, p_2$  ARE ORTHO TO  $p_0$

$$\boxed{p_1 = x}$$

$$\begin{aligned} \langle p_2, p_0 \rangle &= 0 \\ &= \langle x^2, p_0 \rangle + \alpha_{21} \langle p_1, p_0 \rangle + \alpha_{20} \langle p_0, p_0 \rangle \end{aligned}$$

BECAUSE WE... WANT THIS  $x$  NO, WAS

$$\langle x^2, p_0 \rangle = \langle x^2, 1 \rangle = \frac{2}{3}$$

$$\langle p_0, p_0 \rangle = \|p_0\|^2 = 2$$

$$\alpha_{20} = -\frac{\langle x^2, p_0 \rangle}{\|p_0\|^2} = -\frac{2/3}{2} = -\frac{1}{3}$$

$$\begin{aligned} \langle p_2, p_1 \rangle &= 0 \\ &= \langle x^2, p_1 \rangle + \alpha_{21} \langle p_1, p_1 \rangle + \alpha_{20} \langle p_0, p_1 \rangle \end{aligned}$$

$$\langle x^2, p_1 \rangle = \int_{-1}^1 x^2 \cdot x \, dx = \int_{-1}^1 x^3 \, dx = 0 \quad (\text{ODD FUNC.})$$

$$\langle p_1, p_1 \rangle = \|p_1\|^2 = \int_{-1}^1 x^2 \, dx = \frac{2}{3}$$

$$\alpha_{21} = \frac{\langle x^2, p_1 \rangle}{\|p_1\|^2} = \frac{0}{2/3} = 0$$