$$f(x) = g(x)/\sqrt{1-x^2}$$

$$p_n(\cos\theta) = \sum_{j=0}^{n} a_{nj} \cos(j\theta)$$
 $a_{nn} = 1$

Consider Hu vector space

Change of basis:

$$L: \cos(nb) \rightarrow P_n(\cos\theta).$$

Matrix form

a ₈₀ 0 0 0 0	[] [P((co; 0)]
a ₁₀ a ₁₁ 0 0 6	(030) p.(c030)
a ₇₀ a ₂₁ a ₂₂ 0 0	COS 20 = p (cos0)
azo azo azz azz o	Cos 30 P3 (crs 8)
	· •

Orthogonality:
$$\int_{J=0}^{T} P_{m}(\omega s\theta) P_{n}(\cos \theta) q(\cos \theta) = 0, \text{ with } 0$$

$$q(\cos \theta) = \int_{J=0}^{T} q_{J}(\cos(J\theta))$$

$$q(\cos \theta) \cos(\omega \theta) = \sum_{J=0}^{L} q_{J}(\cos(J\theta)) + \cos((J-\omega)\theta)$$

$$q(\cos 2\theta + \frac{1}{2}q_{1}\cos(3\theta) + \frac{1}{2}q_{1}\cos \theta)$$

$$q(\cos 2\theta + \frac{1}{2}q_{1}\cos(3\theta) + \frac{1}{2}q_{2}\cos(4\theta) + \frac{1}{2}q_{2}$$

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$$q(\cos \theta) = \int_{J=0}^{L} q_{1}(\cos(J\theta) + \frac{1}{2}q_{2}\cos\theta)$$

$$q(\cos \theta) = \int_{J=0}^{L} q_{1}(\cos(J\theta)) q(\cos \theta) = 0, \text{ with } 0$$

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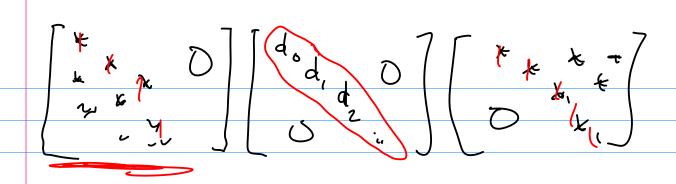
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$$q(\cos J\theta)$$



STEPS: (1) Colculate | 0 12 12 0 Q

(2) Proform LDU decomp

(3) runse of the L = coeffé of ou expansion of Pn(coso)

Compare: Pn(x) w/ q(x)T(x)

 $\int P_{m}(x) q(x) P_{n}(x) dx = 0 \quad \forall \quad m \neq n \quad \Rightarrow) \int P(x) q(x) P_{n}(x) = 0$ $\forall \quad P(x) \quad \omega \quad d(p(p(x)) < n$

 $p(x) = P_0 + P_1 + P_2$ $\int p(x) g(x) p_1(x) = \int p_1(x)^2 g(x) dx$

X

$$q(x)p(x) = \sum_{j=n}^{n+d} \tilde{a}_{nj} T_{j}(x)$$

$$= \sum_{j=n}^{n+d} \tilde{a}_{nj} T_{j}(x)$$

Bother weight:
$$\frac{1}{9(x)\sqrt{1-x^2}}$$



