

Quiz #5 (6.1 - 6.5)Clearly show *all* of your work.

15 pts.

Scientific calculators allowed.

1) Use the inner product

$$\langle \mathbf{p}, \mathbf{q} \rangle = \int_0^1 p(x)q(x) dx$$

to compute the following for

$$\mathbf{f} = f(x) = x^2$$

$$\mathbf{g} = g(x) = x^2 + x$$

- $d(\mathbf{f}, \mathbf{g})$ (exactly) (3 pts)
- the angle between \mathbf{f} and \mathbf{g} . (4 pts.)
(accurate to three decimal places)

2) Find the QR -Decomposition of

$$\begin{bmatrix} 1 & 1 & 0 \\ 1 & 2 & 1 \\ 0 & 0 & 2 \end{bmatrix} \quad (7 \text{ pts})$$

3 and *Bonus*)

An **inner product** on a real vector space V is a function that associates a real number $\langle \mathbf{u}, \mathbf{v} \rangle$ with each pair of vectors \mathbf{u} and \mathbf{v} in V in such a way that the following axioms are satisfied for all vectors \mathbf{u} , \mathbf{v} , and \mathbf{w} in V and all scalars k .

(+½ pt. each - use *formulas*, *not* the axiom names.)

(1)

(2)

(3)

(4)