Assignment 3, due Thursday, Nov. 5, 2009, **before class**

For partial credit, show all your work!

1[12P]) Which one of the following defines an inner product on the given vector space V. **If it is not an inner product list at least one condition from the definition that does not work and show why it does not work!**

a) $V = \mathbb{R}^2$, $((x,y),(u,v)) = xv$.

b) $V = \mathbb{R}^3$, $((x,y,z),(u,v,w)) = 2xu + 4yv + zw$.

c) $V = \mathbb{R}^3$, $((x,y,z),(u,v,w)) = 3xu - 2yv + 10zw$.

d) $V = C([-1,1])$ (the space of continuous **real valued** functions on $[-1,1]$), $(f,g) = \int_{-1}^{1} f(t)g(t)\, e^t\, dt$.

e) $V = C([-1,1])$, $\int_{-1}^{1} f(t)g(t)t\, dt$.

g) $V = C([-1,1])$, $(f,g) = \int_0^1 f(t)g(t)\, dt$.

2[6P]) Consider the inner product $((x,y,z),(u,v,w)) = 2xu + 5yv + 3zw$ on $\mathbb{R}^3$:
a) Evaluate $((1,-2,3),(1,1,-3)) =$

b) Are the vectors $(1,-1,1)$ and $(1,1,1)$ orthogonal with respect to this inner product?

3[6P]) Evaluate the following inner product and norms using the inner product $(f,f) = \int_{-1}^{1} f(t)g(t)\, dt$ on $C([-1,1])$:

a) $(t^3 + 2t^2 - t, t^2) =$

b) $\|t^3 - t\| =$.

4[6P]) Consider the inner product $((x,y,z),(u,v,w)) = x\bar{u} + y\bar{v} + z\bar{w}$ on $\mathbb{C}^3$.

a) Evaluate the inner product $((1+i, 2-3i, 3),(2i, 2+3i, 1)) =$

b) Evaluate the norm $\|(2+i, 3-2i, i)\| =$.
