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Cover Sheet for 2013-2014 Spring Semester MATH 3210/5210 (Barsamian) Homework 10
(Due Wednesday, April 23, 2014. Staple this page to the front of your work.)

Problem:	1	2	3	4	5	Total	Rescaled
Your Score:							
Possible:	20	20	20	20	20	100	10

[1] (Five True False questions from suggested exercise 6.1#1.) The True/False answers for these questions are given in the back of the book. For each question, give the true/false answer and also explain why the answer is true or false. Justify your explanation by referring to things that the book says in Section 6.1.

6.1#1(a) An inner product is a scalar-valued function on the set of ordered pairs of vectors.
6.1#1(c) An inner product is linear in both components.
6.1#1(d) There is exactly one inner product on the vector space R^n.
6.1#1(e) The triangle inequality only holds in finite-dimensional inner product spaces.
6.1#1(h) If $\langle x, y\rangle = 0$ for all x in an inner product space, then $y = 0$.

For problems [2],[3],[4], [5] do the following:
(a) Compute $\langle x, x\rangle$ and $\|x\|$.
(b) Compute $\langle y, y\rangle$ and $\|y\|$.
(c) Compute $\langle x, y\rangle$ and $|\langle x, y\rangle|$.
(d) Compute $\langle x + y, x + y\rangle$. (Hint: Use the results of (a),(b),(c)) and $\|x + y\|$.
(e) Verify both the Cauchy-Schwarz Inequality and the Triangle Inequality.
For all computations, show the exact answers in symbols involving fractions. If the exact answer is irrational, also give a decimal approximation rounded to three decimal places.

[2] Let $x = (2, -1, 3) \in R^3$ and $y = (4, 5, -7) \in R^3$. (Use the inner product defined in Example 1 on page 330.)

[3] Let $x = (2 + i, 3 - 2i) \in C^2$ and $y = (-3 + i, -1 - 2i) \in C^2$. (Use the inner product defined in Example 1 on page 330.)

[4] Let $x = A = \begin{pmatrix} 2 & 3+i \\ 1 & i \end{pmatrix} \in M_{2\times 2}(C)$ and $y = B = \begin{pmatrix} 4+i & 5i \\ 3 & 2 \end{pmatrix} \in M_{2\times 2}(C)$.
(i) Use the inner product defined in Example 4 on page 331.
(ii) Use the *Frobenius inner product*, defined in Example 5 on page 331.

[5] Let $x = f(t) = t^2 \in C([0,1])$ and $y = g(t) = e^t \in C([0,1])$. (Use the inner product defined in Example 3 on page 331.) (You are encouraged to use Wolfram Alpha to do the integrals, but your answer must include a clear presentation of both the integral and of the answer, with the answer in both symbolic form and decimal approximation. And be careful to type your integrals correctly!)