MATH 360 –Homework 6

Due Wednesday, October 25, 2017

To discuss in recitation:

1. Textbook page 173, problems 3, 4

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2. Textbook page 178, problems 3,4.

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3. Textbook page 188, problems 1,3.

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4. Prove the integration by parts formula, and work a few examples.

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5. Textbook page 69, problems 4, 5, 6, 7

To be handed in on October 25:

1. Textbook page 173, problems 5, 6.

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2. Textbook page 177, problems 2, 5.

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3. Textbook page 183, problem 9.

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4. Suppose f is a continuously differentiable function on $[a, b]$ and that $f(a) = f(b) = 0$. Further, assume that

$$\int_a^b (f(x))^2\,dx = 1.$$

(a) Prove that

$$\int_a^b xf(x)f'(x)\,dx = -\frac{1}{2}$$

(b) Also prove that

$$\int_a^b (f'(x))^2\,dx \cdot \int_a^b x^2(f(x))^2\,dx \geqslant \frac{1}{4}.$$

(c) For what function(s) (if any) is equality achieved in (b)?

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5. Textbook page 69, problens 9, 10, 11