

**MATH 360 –Homework 10**  
Due Wednesday, November 29, 2017

**To discuss in recitation:**

1. Textbook page 254, problems 1, 3, 4.

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2. Textbook page 262, problems 2, 3, 4.

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3. (a) Express  $\int_0^x \arctan t \, dt$  as a power series in  $x$ , and discuss the range of validity of this series (endpoints)?

(b) Using (a), show that

$$\frac{\pi}{4} - \ln \sqrt{2} = 1 - \frac{1}{2} - \frac{1}{3} + \frac{1}{4} + \frac{1}{5} - - + \dots$$

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**To be handed in on November 29:**

1. Textbook page 254, problem 2.

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2. Textbook page 262, problems 5, 10.

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3. Textbook page 268, problem 4.

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4. Justify the formula

$$\int_0^1 \frac{t^{p-1}}{1+t^q} \, dt = \frac{1}{p} - \frac{1}{p+q} + \frac{1}{p+2q} - \dots$$

for positive integers  $p$  and  $q$ . For  $p = 10$  and  $q = 40$ , use this to estimate the integral to two decimal places.

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5. Prove that the series  $\sum_{n=1}^{\infty} \frac{2x}{n^2 - x^2}$  is uniformly convergent on any finite closed interval not containing any of the points  $\pm 1, \pm 2, \dots$