

Math 201 - Quiz 1 (Spring 15)

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- Write the answers to questions 2, 3 and 4 on their sheets. The first question has an extra sheet for you to write your answers on it. Any part of your answers written on the wrong sheet will not be graded. Note that a sheet of paper has two sides.
- There are 4 problems in total. Some questions have several parts to them. Make sure that you attempt them all.
- This is a closed book exam and no calculators are allowed.

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Name :

ID # :

Section :

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<i>Q1</i>	
<i>Q2</i>	
<i>Q3</i>	
<i>Q4</i>	
<i>TOTAL</i>	

Problem 1

(12 points each) Which of the following series converge and which diverge? Those which converge, do they converge absolutely or conditionally? When possible find the sum of the series.

i-

$$\sum_{n=1}^{\infty} (-1)^n \frac{\sin(n)}{n^2}$$

ii-

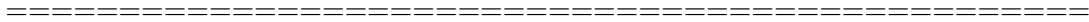
$$\sum_{n=1}^{\infty} \frac{n}{n^2 + 2n + 3}$$

iii-

$$\sum_{n=0}^{\infty} (-1)^n \frac{\pi^n}{3^n n!}$$

iv-

$$\sum_{n=2}^{\infty} (-1)^n \frac{n}{(\ln(n))^2}$$



ADDITIONAL SHEET FOR PROBLEM 1 ANSWER

Problem 2

(21 points) Evaluate the following integral

$$\int_0^1 x^2 e^{-x^2} dx$$

with an error less than 0.01. Is your answer an over- or an under-estimate?

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Problem 3

(21 points) Find the Taylor series at 0 of $\sin(x^2)$. What is its radius of convergence? Assuming that the Taylor series converges to the function inside its radius of convergence, estimate $\sin(0.01)$ with an error less than 10^{-6} . Is your answer an under- or an over-estimate?

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Problem 4

(10 points) Suppose $x > 0$. Define a sequence $\{a_n\}_{n=1}^{\infty}$ in the following way:

$$a_1 = x \quad , \quad a_2 = x^x \quad , \quad a_3 = x^{x^x} \quad , \quad a_4 = x^{x^{x^x}} \quad \dots$$

If you know that $\lim_{n \rightarrow \infty} a_n = 5$, then what is x ?

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