



MATHEMATICS 201
FALL SEMESTER, 2003-04
QUIZ I

Time: 60 Minutes.

Date: November 8, 2003.

Name: _____

ID Number: _____

Section Number: _____

Instructor: Prof. A. Lyzzaik

	<u>GRADE:</u>
PART I.	/50
PART II.	/15
PART II.	/15
PART IV.	/20

Total: /100

I. Investigate the convergence or divergence of the following series:

$$(1) \sum_{n=1}^{\infty} \frac{n^{5/2}}{n^{7/2} + 50n^{3/2} + 100}. \quad (10 \text{ points})$$

$$(2) \sum_{n=1}^{\infty} (\sqrt{n+1} - \sqrt{n})^{n/2}. \quad (10 \text{ points})$$

$$(3) \sum_{n=2}^{\infty} n^2 \sin(1/n) \ln(1 + 1/n). \quad (10 \text{ points})$$

$$(4) \sum_{n=1}^{\infty} \frac{n!}{1 \cdot 3 \cdot 5 \cdots (2n-1)}. \quad (10 \text{ points})$$

$$(5) \sum_{n=1}^{\infty} \frac{1}{n(\ln n)^{\pi/e}}. \quad (10 \text{ points})$$

II. Find the interval of convergence of the power series, and determine the values of x for which the series converges absolutely or conditionally:

$$\sum_{n=1}^{\infty} (-1)^n \frac{(x-1)^n}{\sqrt{n+1}}.$$

(15 points)

III. Find an estimate with an error not exceeding 10^{-5} for the integral:

$$\int_0^{0.5} \frac{1 - \cos x^2}{x^4} dx.$$

(15 points)

IV. Circle the correct answer in the following multiple-choice questions:

(5 points each)

1. The sum of the series

$$\sum_{n=1}^{\infty} \left\{ \frac{2^n}{3^n} - \frac{2n+1}{n^2(n+1)^2} \right\}$$

is

- (a) 4.
- (b) 3.
- (c) 2.
- (d) 1.
- (e) None of the above.

2. The Fourier series

$$\frac{a_0}{2} + \sum_{n=1}^{\infty} [a_n \cos nx + b_n \sin nx]$$

of the function $f(x)$ which is zero if $-\pi < x < 0$ and 2 if $0 \leq x \leq \pi$ satisfies:

- (a) $a_n = 0$ if n is even and $a_n = 2/(n\pi)$ if n is odd.
- (b) $b_n = 0$ if n is odd and $b_n = 2/(n\pi)$ if n is even.
- (c) $b_n = 0$ if n is even and $b_n = 2/(n\pi)$ if n is odd.
- (d) The value of the Fourier series at 0 is zero.
- (e) None of the above.

3. The Maclaurin's series of the indefinite integral

$$f(x) = \int_0^x \frac{\ln(1-t)}{t} dt$$

is

- (a) $\sum_1^{\infty} \frac{x^n}{n^2}$.
- (b) $\sum_1^{\infty} (-1)^n \frac{x^n}{n^2}$.
- (c) $\sum_1^{\infty} -\frac{x^n}{n^2}$.
- (d) $\sum_1^{\infty} \frac{x^n}{n}$.
- (e) None of the above.

4. The Maclaurin series of the $(1+x^2)^{1/3}$ is:

- (a) $1 + x^2/3 - x^4/9 + 5x^6/81 - 10x^8/243 + \dots$
- (b) $1 + x^2/3 + x^4/9 + 5x^6/81 + 10x^8/243 + \dots$
- (c) $1 - x^2/3 + x^4/9 - 5x^6/81 + 10x^8/243 + \dots$
- (d) $1 + x^2/3 - x^4/9 + 5x^6/27 - 10x^8/81 + \dots$
- (e) None of the above is TRUE.