

University of Ottawa - Department of Mathematics and Statistics
MAT 1322 D - Calculus II
Instructor: Petko Kitanov
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Midterm Examination II
Version 1

Name:..... Student Number:.....

Instructions :

- Please write your name and student number on the indicated area above.
- This is a closed book exam. It contains **8 questions**; there are 35 points in total.
- You can use non-programable and non-graphical calculators but no other aids are permitted.
- Clearly indicate the solution of each problem.
- Show all your work. A correct answer without intermediate steps will receive no credit.
- Time allowed: 80 minutes.

GOOD LUCK!

Student Number : _____ Final Grade : _____ out of 35

Question	1	2	3	4	5	6	7	8
Grade								

Question 1. [5 points] Determine whether the sequence $a_n = \frac{\ln(2n+1)}{\sqrt{n}}$ is convergent or divergent.

Question 2. [4 points] Express the number $0.5\overline{42} = 0.5424242\dots$ as a ratio of two integers.

Question 3. [3 points] Consider the series $\sum_{n=1}^{\infty} \frac{4}{(4n-3)(4n+1)}$

(a) Using the fact that this is a telescoping series and it can be written as $\sum_{n=1}^{\infty} \left(\frac{1}{4n-3} - \frac{1}{4n+1} \right)$,

give a simple formula for the partial sum $s_n = \sum_{k=1}^n \frac{4}{(4k-3)(4k+1)}$.

(b) Find the sum of the given series.

Question 4. [4 points] Use appropriate comparison test to determine whether the series

$\sum_{n=1}^{\infty} \frac{5 \cos^2(n+1)}{(n^2+3)}$ is convergent or divergent.

Question 5. [3 points] What is the smallest value of N for which we are assured that the error made by approximating the alternating series

$$s = \sum_{n=1}^{\infty} \frac{(-1)^n}{n^{3/2}}$$

by its partial sum

$$s_N = \sum_{n=1}^N \frac{(-1)^n}{n^{3/2}}$$

is at most 10^{-2} ?

Question 6. [6 points] Determine the interval of convergence of the following power series

$$\sum_{n=0}^{\infty} \frac{(-5)^n x^n}{(n+1)(n+5)}.$$

Question 7. [3 points] Develop the function

$$\frac{x}{x+5}$$

as a power series centered at $x = 0$. What is the coefficient of x^5 in this series?

Question 8. [7 points] Consider the power series

$$f(x) = \sum_{n=0}^{\infty} \frac{2^n x^n}{(n+2)!}$$

- a) What is the radius of convergence of this series?
- b) Compute the power series of an antiderivative, $\int f(x) dx$, of $f(x)$ centered at $x = 0$. What is the coefficient of x^4 ?
- c) What is the radius of convergence of the series for $\int f(x) dx$?