

MATH 1312 FALL 2008

CALCULUS II

THIRD MIDTERM EXAM

MONDAY, NOVEMBER 17, 7:30 PM - 9:00 PM

YOUR NAME (PLEASE PRINT):

Instructions: This is a closed book, closed notes exam. **Use of calculators is not permitted.** You must justify all of your answers to receive credit. Notation is important, and points will be deducted for incorrect use. Please do all of your work on the paper provided.

The Honor Code requires that you neither give nor receive any aid on this exam.

Please indicate that you have read and understood these guidelines by signing your name in the space provided:

Pledged: _____

Do not write below this line

Problem	1	2	3	4	5	6	7	8	9	10
Points	8	10	10	10	10	10	8	15	12	8
Score										

Total:_____

1. Suppose that we define a sequence by setting $a_{n+1} = 4 - a_n$ for $n \geq 1$.
 - a. If $a_1 = 1$, does the sequence $\{a_n\}$ converge or diverge?

- b. If $a_1 = 2$, does the sequence $\{a_n\}$ converge or diverge?

Problems 2 - 6: Determine if the series converges absolutely, converges conditionally, or diverges.

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

3.
$$\sum_{n=1}^{\infty} \frac{5 + 2n}{(1 + n^2)^2}$$

4. $\sum_{n=1}^{\infty} \frac{2 + (-1)^n}{n\sqrt{n}}$

5. $\sum_{n=1}^{\infty} \frac{n!}{100^n}$

6. $\sum_{n=1}^{\infty} \frac{(-1)^n \arctan n}{n^2}$

7. Suppose that the series $\sum_{n=0}^{\infty} c_n(x-2)^n$ converges when $x = 4$ and diverges when $x = -1$. Determine if the following series converge or diverge. You do not need to justify your answers and no partial credit is possible.

a. $\sum_{n=0}^{\infty} c_n(-1)^n$ _____ b. $\sum_{n=0}^{\infty} 4^n c_n$ _____

c. $\sum_{n=0}^{\infty} 2^n c_n$ _____ d. $\sum_{n=0}^{\infty} n c_n$ _____

8. If $f(x) = \sum_{n=1}^{\infty} \frac{(x+1)^n}{n4^n}$, find the intervals of convergence for $f(x)$ and $f'(x)$.

9. Find power series centered at $a = 0$ equal to the following functions. Be sure to state where (i.e. for what values of x) these series representations are valid.

a. $a(x) = \frac{1}{x + 10}$

b. $b(x) = \frac{x}{x^2 + 10}$

c. $c(x) = \ln(x^2 + 10)$

10. Find the Taylor series for $f(x) = x^4 - 3x^2 + 1$ at the point $a = 1$.

