

MATH 1312 FALL 2010

CALCULUS II

THIRD MIDTERM EXAM

WEDNESDAY, DECEMBER 1

YOUR NAME (PLEASE PRINT):

Instructions: This is a closed book, closed notes exam. **Use of calculators or other electronic devices such as cell phones, mp3 players, etc. is not permitted.** Unless indicated otherwise, you must justify all of your answers to receive credit. Unjustified answers and/or disorganized or otherwise illegible work will receive partial credit at best. 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
Points	35	6	8	20	15	10	6
Score							

Total:_____

1. Determine if the following series are absolutely convergent, conditionally convergent, or divergent, and indicate which test(s) you used to arrive at your conclusion. If you use one of the comparison tests, be sure to write down the series to which you are making a comparison. Other than this, you do not need to show any work. An example is shown below.

Ex. $\sum_{n=1}^{\infty} \frac{1}{n^3 + 2}$ is: absolutely convergent
 by the: comparison test, with $\sum_{n=1}^{\infty} \frac{1}{n^3}$.

a. $\sum_{n=1}^{\infty} \frac{n^2 + 2}{2n^4 - 5n^2 + 1}$ is: _____
 by the: _____
 _____.

b. $\sum_{n=1}^{\infty} (-1)^n \frac{n^n}{3^n n!}$ is: _____
 by the: _____
 _____.

c. $\sum_{n=3}^{\infty} \frac{(-1)^n \ln n}{n - 2}$ is: _____
 by the: _____
 _____.

d. $\sum_{n=2}^{\infty} \frac{(-1)^{n+1}}{n(\ln n)^2}$ is: _____

by the: _____
_____.

e. $\sum_{n=1}^{\infty} \left(\frac{1}{5}\right)^{-1/n}$ is: _____

by the: _____
_____.

f. $\sum_{n=1}^{\infty} \frac{\cos(2n) \arctan(3n)}{4n^2 + 5}$ is: _____

by the: _____
_____.

g. $\sum_{n=2}^{\infty} \frac{3^n}{1 + 2^n}$ is: _____

by the: _____
_____.

2. Suppose the n th partial sum of the series $\sum_{n=1}^{\infty} a_n$ is given by $s_n = \frac{2n-1}{2n+1}$.

a. Find a formula for a_n .

b. Find the exact value of $\sum_{n=1}^{\infty} a_n$.

3. If the power series $\sum_{n=0}^{\infty} c_n(x+1)^n$ converges when $x = -4$ and diverges when $x = 4$, determine if the following series converge or diverge.

a. $\sum_{n=0}^{\infty} (-1)^n c_n 6^n$

b. $\sum_{n=1}^{\infty} n c_n$

4. Find the Taylor series (centered at zero) for the following functions.

a. $\frac{1}{x+2}$

b. $\frac{1}{(x+2)^2}$

c. e^{-x^2}

d. $\int e^{-x^2} dx$

5. Find the interval of convergence of the power series $\sum_{n=0}^{\infty} \frac{(x-7)^n}{4^n \sqrt{n}}$.

6. Evaluate $\lim_{x \rightarrow 0} \frac{\sin x - x}{x \cos x - x}$.

7. Find the sum of the series $\sum_{n=1}^{\infty} \left(\frac{1}{\sqrt{n}} - \frac{1}{\sqrt{n+1}} \right)$, or show that it diverges.

