

## EXAM 3

### MAT 222

Name \_\_\_\_\_

April 9, 2010

- ❖ You have 50 minutes to complete the exam.
- ❖ Partial credit will be given so you must **SHOW ALL OF YOUR WORK**. Put all of your work and answers in the space provided. Scratch paper is not allowed.
- ❖ Place your books, notebooks, etc. on the floor. The only items on your desk should be this exam and pencil/eraser/pen. Calculators are not allowed.

Problem	Points	Points per part	Points Earned
1	8	4	
2	4		
3	10		
4	6		
5	10		
6	6		
7	8	4	
8-13	48	8	
<b>TOTAL</b>	<b>100</b>		

Please circle your section:

8:00  
Friske

11:30  
Friske

## I. Concepts and Facts

1. State the Maclaurin series for

a.  $e^{2x} =$  \_\_\_\_\_

b.  $\frac{1}{1+x} =$  \_\_\_\_\_

2. Find the sum of the series  $\sum_{n=0}^{\infty} \frac{1}{4^n} x^n$  where  $(-4 < x < 4)$ : \_\_\_\_\_

3. Find the Maclaurin polynomial  $P_3(x)$  for the function  $f(x) = \ln(2 - x)$ .

4. How big is the error in using the partial sum  $S_{29}$  to approximate the sum of the series  $\sum_{n=1}^{\infty} (-1)^n \frac{n}{n^2+1}$ ?

5. Determine the Taylor series for  $f(x) = e^{x/2}$  centered at  $c = 1$ .

6. Find the sum of the series  $\sum_{k=1}^{\infty} (\frac{1}{k} - \frac{1}{k+1}) =$  \_\_\_\_\_

7. Is the series  $\sum_{n=1}^{\infty} \frac{(-1)^n}{n^3}$

a. Absolutely convergent? (why or why not?)

b. Conditionally convergent? (why or why not?)

**II. Applications.** For each of the following series, determine whether it converges or diverges. Show your work.

8.  $\sum_{n=0}^{\infty} \frac{3^n}{n!}$  (ratio test)

9.  $\sum_{n=0}^{\infty} \frac{4n}{n^2 - 3n + 1}$  (limit comparison)

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

11.  $\sum_{n=1}^{\infty} \frac{2n}{3n-1}$

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

13.  $\sum_{n=1}^{\infty} \frac{6n^2}{2n^3 - 1}$  (integral test)