

MA 114 - Calculus II

Exam 3

10 April 2008

Name:_____

Score:_____ /100 Points

Instructions:

- You may not use any outside assistance on this exam. You may not use books, notebooks, other people's exams, or any other materials to cheat on this exam.
- You may not use a graphing calculator on this exam.
- The use of electronic equipment such as mp3 players, ipods, cell phones and other electronic devices during the exam is prohibited.
- If you are caught cheating on the exam, you will be given a 0 for a grade.
- Write clearly during the exam and fully erase or mark out anything you do not want graded.
- You must give exact answers and fully reduce fractions to receive full credit. Approximate and unreduced answers will receive only partial credit.
- **You must show all your work to receive full credit unless otherwise stated.**

1. (10 points) Give the parametric equations for the line in the xy -plane which passes through the points $(-2, 9)$ and $(4, 12)$.

2. The curve W is given by the parametric equations:

$$x(t) = e^{4t}, \quad y(t) = \sin(2\pi t).$$

- (a) (10 points) Find $\frac{dy}{dx}$ and express it as a function of t .

- (b) (10 points) Give the parametric equations for the tangent line to W at the point where $t = 1/4$.

3. (10 points) Determine if the series

$$\sum_{n=1}^{\infty} \frac{2^n n!}{(n+2)!}$$

is convergent or divergent.

4. (10 points) Determine if the series

$$\sum_{k=1}^{\infty} \frac{1}{2+3^k}$$

is convergent or divergent.

5. (10 points) Find the radius of convergence and interval of convergence of the power series:

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

6. (2 points each) Answer each of the following questions either True or False. You must write the entire word to get full credit. You do not need to show any work on this problem.

(a) To determine if the series $\sum_{n=1}^{\infty} \frac{1+\sin(n\pi/2)}{n}$ converges, you could apply the integral test.

(b) If $\sum |a_n|$ is divergent then $\sum a_n$ is divergent.

(c) The series $\sum_{n=1}^{\infty} (-1)^n/n$ is conditionally convergent.

(d) The curve represented by the parametric equations $x = \cos t$, $y = \sin t$, $0 \leq t \leq 2\pi$ is a circle.

(e) If $\lim_{n \rightarrow \infty} a_n = 0$, then $\sum a_n$ is convergent.

7. (10 points each) Find a power series representation for the functions below. Do NOT determine their intervals of convergence.

(a) $f(x) = \frac{1}{1+9x^2}$.

(b) $f(x) = \ln(5 - x)$.

8. (a) (3 points) What is the Maclaurin series expansion of e^x ? You do not have to justify your work.

(b) (7 points) Using part (a) of this problem, determine the Taylor series for the function:

$$g(x) = (x - 3)^2 e^x$$

centered at $a = 3$.

9. Extra Credit: (5 points) Consider the parametric equations:

$$x = t/\pi + 2 \cos t, \quad y = 4 \sin t, \quad 0 \leq t \leq 2\pi.$$

On the axis below, graph the curve C described by the above parametric equations and indicate with arrows the direction that the curve is traced.

