MA 126 NAME________________________________

Closed Book, No Calculators Spring, 2010

PART 1. **Part 1 consists of 10 questions. Show your work or give reasons, and clearly write your answer in the space provided. (6 points each)**

1. Determine whether the geometric **series** $\sum_{n=1}^{\infty} \frac{2(3)^n}{4^n}$ is convergent or divergent. If it is convergent, find its sum.

2. Determine whether the **series** $\sum_{n=1}^{\infty}\left(\frac{5}{n^4}+\frac{4}{n\sqrt{n}}\right)$ is convergent or divergent. Explain.

3-5. Determine whether each of the following **sequences** $\{a_n\}$ converges or diverges!

3. $a_n = \cos(n\pi)$

4. $a_n = \dfrac{n^2}{5^n}$

5. $a_n = (1 + {}^{2}\!/_{n})^n$

6. $a_n = \dfrac{(n+2)!}{n!}$

7-10. Determine whether the following series converge or diverge.

7. $\sum_{n=1}^{\infty} \dfrac{n-1}{4(3)^n}$

8. $\sum_{n=1}^{\infty} \frac{-n}{2n+1}$

9. $\sum_{n=2}^{\infty} \frac{1}{n\sqrt{\ln n}}$

10. $\sum_{n=1}^{\infty} \frac{n-1}{n^3+1}$

Part 2. **Part 2 consists of 4 problems of varying credit. Show all your work for full credit! Displaying only the final answer (even if correct) without the relevant steps is not enough.**

Problem 1 (10 points)

Find the interval of convergence for the power series $\sum_{n=0}^{\infty} \frac{(x+1)^n}{\sqrt{n}}$. Remember to check any endpoints.

Problem 2 (20 points)

a. Find a power series representation for the function $f(x) = \frac{2}{1-2x}$. For what values of x does it equal the function?

b. Find a power series representation for $g(x) = \ln(1-2x)$. For what x does it equation the function?

Problem 3 (10 points)

Use a partial sum of the Maclaurin series for e^x to compute $e^{-0.1}$ to three decimal place accuracy. How do you know that that partial sum you used gives the desired accuracy?