Second Midterm for Math 230

November 7, 2007

Last Name:_____ First Name:_____

Discussion Session(Your TA's name):_____

1. Determine the convergence or divergence of the following series, show your reasoning

   (a) (10 points)

$$\sum_{n=0}^{\infty} \frac{3}{\sqrt{n^2+n+1}} dx;$$

   (b) (10 points)

$$\sum_{n=0}^{\infty} \frac{3n^3}{2^n};$$

(c) (10 points)

$$\sum_{n=0}^{\infty} \frac{(-1)^n}{\ln\left(\sqrt{n}+2007\right)}.$$

2. (10 points) Find the sum of the geometric series

$$-5+4-\frac{16}{5}+\frac{64}{25}-\frac{256}{125}+\frac{1024}{625}-\cdots$$

if it converges, or show it diverges.

3. (15 points) Determine the radius of convergence and interval of convergence for the power series

$$\sum_{n=0}^{\infty} \frac{x^n}{(n+1)\,3^n}.$$

Show your reasoning.

4. (15 points) Determine the Taylor series for

$$f(x) = \sqrt{x}.$$

at $a = 9$ and find its radius of convergence.

5. (15 points)Find all solutions to the second order nonhomogeneous differential equation

$$y'' - 2y' + 3y = 6e^{2x}.$$

6. (15 points) Solve the initial value problem:

$$y' + \frac{2x}{1+x^2}y = 4x, \qquad y(0) = 5.$$