
Friday, Mar 14, 2008

STUDENT NAME: _____

EXAM III – MATH 136, SPRING 2008

READ EACH PROBLEM CAREFULLY!

You need to provide reasonable explanation for your answers in order to get credit for your work!!!!
The exam has 8 problems on 4 pages! Turn in all pages!

• **Problem 1**

Determine whether the sequence below is convergent or divergent. If convergent, find its limit.

$$a_n = \frac{\cos^2 n}{2^n}, \quad n \geq 1$$

• **Problem 2**

Test the series for convergence or divergence. Explain!

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

- **Problem 3**

Determine whether the series is absolutely convergent, conditionally convergent or divergent.

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

- **Problem 4**

Using the integral test, determine whether the series

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

is convergent or divergent.

- **Problem 5**

Determine if the geometric series below is convergent or divergent. If convergent, find its **sum**.

$$\sum_{n=0}^{\infty} (-1)^n \frac{3^n}{2^{2n+1}}$$

- **Problem 6**

Find the **radius of convergence** and **interval of convergence** of the power series

$$\sum_{n=1}^{\infty} \frac{(x-1)^n}{n^2 5^n}$$

• **Problem 7**

(a) Find the Maclaurin series of the function $f(x) = \ln(1 + x^3)$ and determine its radius of convergence.

(b) Express the indefinite integral below as a power series.

$$\int \frac{\ln(1 + x^3)}{x} dx$$

• **Problem 8**

Find the Taylor series for the function

$$f(x) = \frac{1}{1 - 2x}, \quad \text{centered at } a = 1.$$

Determine its radius of convergence and interval of convergence.