

## Math 12 Spring 2009: Exam 3

**Name:**

**Instructions:** There are 4 questions on this exam each of which is scored out of 8 points for a total of 32 points. You may not use any outside materials (eg. notes or books). You have 50 minutes to complete this exam. Remember to fully justify your answers.

**Score:**

**Problem 1.** Determine whether or not the sequence converges, and finds its limit if it does converge.

(a)  $a_n = \frac{n^2+5}{\sqrt{4n^4+n}}$

(b)  $a_n = \frac{n}{(\ln n)^2}$

**Problem 2.** Determine whether or not the following series converge absolutely, converge conditionally, or diverge.

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

(b)  $\sum_{n=1}^{\infty} \frac{5^n}{(\ln 2)^n}$ .

**Problem 3.** Find the interval and radius of convergence of

$$\sum_{n=1}^{\infty} \frac{(x+2)^n}{\sqrt{n}}.$$

**Problem 4.** Approximate  $\int_0^1 \frac{1-e^{-x}}{x} dx$  to within  $\frac{1}{100}$ .