Calculus II, Exam III, Spring 2007

Name:_____

Student signature:_____

Show all your work and give reasons for your answers. Good luck!

Part I. All problems in part I are worth 11 points each.

(1) Evaluate the following limit: $\lim_{n\to\infty} \frac{\ln(n)}{n}$.

(2) Determine if the the series $\sum_{n=1}^{\infty} \frac{(-1)^n}{n!}$ is absolutely convergent, conditionally convergent, or divergent.

(3) If the series $\sum_{n=1}^{\infty} \frac{(-1)^n}{n!}$ is convergent, estimate its sum with an error less than 10^{-3}. [You do not need to compute and add the terms in the finite sum.]

(4) Determine the interval and radius of convergence of the sum $\sum_{n=1}^{\infty} \frac{(-1)^n x^n}{3^n \ n^2}$.

(5) Find the interval and radius of convergence of the series $\sum \frac{(2x+1)^n}{(2n)!}$.

(6) Express the function $f(x) = \frac{3}{2+x}$ as a power series. You must state the interval of convergence for the series.

Part II. All problems in part II are worth 17 points.

(7) Express the function $f(x) = \frac{1}{(2+x)^2}$ as a power series. You must state the interval of convergence of the series.

(8) Use power series to approximate $\int_0^{1/10} \frac{1}{1+x^7}\,dx$ with an error less than $(10)^{-10}$. [You do not need to compute and add the terms in the sum.]