Math 224.02 Name:________________________________

Lab 9 - Sections 11.7 & 11.8

December 3, 2009

1. Find the series' radius and interval of convergence.

   (a) $\sum_{n=0}^{\infty} (x+5)^n$

   (b) $\sum_{n=1}^{\infty} \frac{(x-1)^n}{\sqrt{n}}$

   (c) $\sum_{n=0}^{\infty} \frac{3^n x^n}{n!}$

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

   (e) $\sum_{n=1}^{\infty} (\ln n) x^n$

   (f) $\sum_{n=0}^{\infty} n!(x-4)^n$

2. Verify that the following sums are true. (Using Taylor series at the prescribed values)

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

   (b) $\sum_{n=0}^{\infty} (-1)^n \left[\frac{1}{(2n+1)!} \right] = \sin 1$

3. We know that $e^x = \sum_{n=0}^{\infty} \frac{x^n}{n!}$. Use this to find the Taylor series for the following functions.

   (a) $f(x) = e^{-x}$
   (b) $g(x) = e^{3x}$
   (c) $h(x) = xe^x$
   (d) $f(x) = e^{2x} + e^{-2x}$

4. Determine the Taylor series for e^{2x} about $x = 0$ using each of methods:

   (a) Use the definition of Taylor series, name that the n^{th} coefficient is $a_n = \frac{f^{(n)}(0)}{n!}$.
   (b) Replace x by $2x$ in the Taylor series for e^x.
   (c) Multiply the Taylor series for e^x by itself, as $e^{2x} = e^x \cdot e^x$.