Name:_____

Math 1312
Spring 2005
Test II

1. Determine whether or not the sequence $\{a_n\}$ converges, and find its limit if it does converge.

   (a) $a_n = \dfrac{\ln n}{\sqrt{n}}$

   (b) $a_n = \left(1 + \dfrac{2}{n}\right)^{2n}$

2. Determine whether the following infinite series converges or diverges.

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

(b) $\sum_{n=1}^{\infty} \frac{n!}{e^{n^2}}$

3. Find the Taylor Series expansion of

   (a) $f(x) = \sqrt{1+x}$, $a = 0$

   (b) $f(x) = \cos x$, $a = \frac{\pi}{4}$

4. Find Taylor's formula for the given function f at $a = 0$. Find both the Taylor polynomial $P_n(x)$ of the indicated degree n and the remainder $R_n(x)$.

   (a) $f(x) = \tan x$, $n = 3$

(b) $f(x) = e^{-x}$, $n = 5$

5. (a) Determine the value of p for which the series

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

converges.

(b) Determine whether the series

$$\sum_{n=1}^{\infty} \frac{(-10)^n}{n!}$$

converges absolutely, converges conditionally, or diverges.