Name:____________________

Math 1312
Spring 2005
Pretest II

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

   (a) $a_n = \dfrac{\sin^2 n}{\sqrt{n}}$

   (b) $a_n = (2n^2 + 1)^{\frac{1}{n}}$

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

   (a) $\displaystyle\sum_{n=1}^{\infty} \frac{3^n}{2^n + 4^n}$

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

3. Find the Taylor Series expansion of

(a) $f(x) = \frac{1}{1-x}$, $a = 0$

(b) $f(x) = \ln x$, $a = 1$

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) $f(x) = \ln(1+x)$, $n = 4$

(b) $f(x) = \sqrt{x}$, $n = 3$

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

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

converges.

(b) Determine whether the series

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

converges absolutely, converges conditionally, or diverges.