Math 166: Honors Calculus II Name:____________________

Quiz 10 *Apr. 22, 1999*

1. Determine which of the following statements are true or false.

   a) If $a_n > 0$ and $\sum_{n=1}^{\infty} a_n$ converges then $\lim_{n\to\infty} a_n = 0$.

   b) If $a_n > 0$ and $\lim_{n\to\infty} a_n = 0$ then $\sum_{n=1}^{\infty} a_n$ converges.

   c) If $a_n > 0$ and $\sum_{n=1}^{\infty} a_n$ converges then $\lim_{n\to\infty} a_n^{1/n} = 0$.

   d) If $a_n > 0$ and $\lim_{n\to\infty} a_n^{1/n} = 0$ then $\sum_{n=1}^{\infty} a_n$ converges.

   e) If $a_n > 0$ and $\lim_{n\to\infty} a_n = 0$, then $\sum_{n=1}^{\infty} (-1)^n a_n$ converges.

   f) If $a_n > 0$, $b_n > 0$ and $\lim_{n\to\infty} \dfrac{a_n}{b_n} = 0$ then $\sum_{n=1}^{\infty} a_n$ converges whenever $\sum_{n=1}^{\infty} b_n$ converges.

   g) If $a_n > 0$, $b_n > 0$ and $\lim_{n\to\infty} \dfrac{a_n}{b_n} = 1$ then $\sum_{n=1}^{\infty} a_n$ converges if and only if $\sum_{n=1}^{\infty} b_n$ converges.

   h) If $\sum_{n=1}^{\infty} a_n$ converges, then $\sum_{n=1}^{\infty} |a_n|$ converges.

   i) If $\sum_{n=1}^{\infty} |a_n|$ converges then $\sum_{n=1}^{\infty} a_n$ converges.

   j) If $\sum_{n=1}^{\infty} a_n$ is conditionally convergent, then $\sum_{n=1}^{\infty} (-1)^n a_n$ converges.

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

3. Compute the integral, if possible, or test it for convergence.

a) $\int_1^{\infty} \frac{\log(x)}{x^2} dx$ [Hint: $u = \log(x)$]

b) $\int_0^{\infty} e^{-x^2} dx$