TEST 3

(MATH 200 (B), Fall 06)

1. Use partial fractions to show that $\sum_{k=1}^{\infty} \frac{1}{k(k+1)} = 1$. (10 pts)

2. For the geometric series $\sum_{n=0}^{\infty} e^{-3n}$, find the following: (15 pts)

   (a) the first three terms (b) The ratio *r* (c) The sum of the series.

3. Use the Integral Test to determine whether the series $\sum_{n=1}^{\infty} \frac{3n}{\frac{3}{2}n^2 - 1}$ converges or diverges. (10 pts)

4. Use the Comparison Test to determine whether the series $\sum_{n=1}^{\infty} \frac{1+\cos n}{n^2}$ converges or diverges. (10 pts)

5. Use the Ratio Test to determine whether the series $\sum_{n=1}^{\infty} \frac{(n+1)(n+2)}{n!}$ converges or diverges. (15 pts)

6. Use the *n*-th Root Test to determine whether the series $\sum_{n=1}^{\infty} \frac{(\ln n)^n}{n^n}$ converges or diverges. (15 pts)

7. Find the Taylor series of $f(x) = \frac{1}{x^2}$ at $x_0 = 1$. Make sure you include the n^{th} - term of the series. (15 pts)

8. Find the *radius* of convergence around $x = 1/2$ and the interval of convergence for the power series: $\sum_{k=1}^{\infty} \frac{3^k}{k} (x - \frac{1}{2})^k$. (10 pts)