Math 1220 Section 1 - Fall 2007
Exam II

Answer the questions in the spaces provided on the question sheets. Show all work to receive credit. If you use a convergence test, state which test you are using. Each question is worth 10 points.

Name: ________________________________
1. \[ \lim_{x \to 0} \frac{\tan^{-1} x - x}{8x^3} = \]

2. \[ \lim_{x \to 0} \left( \csc x - \frac{1}{x} \right) \]
3. $\int_{1}^{\infty} 2xe^{-x^2} \, dx =$

4. $\int_{0}^{4} \frac{dx}{(2 - 3x)^{1/3}} =$
5. Find the sum of the series or show that it diverges:

\[ \sum_{k=0}^{\infty} \left[ 2\left(\frac{1}{4}\right)^k + 3\left(-\frac{1}{5}\right)^k \right] \]

6. Determine if the following sum converges or diverges:

\[ \sum_{k=1}^{\infty} ke^{-3k^2} \].
7. Determine if the following series is absolutely convergent, conditionally convergent or divergent:

\[ \sum_{n=1}^{\infty} (-1)^{n+1} \frac{n}{n^2 + 1}. \]

8. Find the convergence set for the given power series:

\[ \sum_{n=1}^{\infty} (-1)^n \frac{(x - 2)^n}{n}. \]
9. Find the power series representation of the given function and determine its radius of convergence:

\[ f(x) = \frac{x^2}{1 - x^4}. \]

10. Find the Taylor series of \( f \) in \( x - a \).

\[ f(x) = 1 + x^2 + x^3, \ a = 1. \]