EXAM 3 MATH 230, CALCULUS II NAME:

Show all work to receive full credit.

1. Use the an appropriate convergence / divergence test to determine whether the series converges or diverges. You must name the test you used.

   (a) $\displaystyle\sum_{n=2}^{\infty} \frac{(-1)^n}{\ln n}$

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

   (c) $\displaystyle\sum_{n=1}^{\infty} \left(1+\frac{1}{5n}\right)^n$

2. Determine whether each series converges or diverges by using one or more of our tests. Make your arguments carefully and fully.

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

(b) $\displaystyle\sum_{n=2}^{\infty} \frac{n!3^n}{(2n)!}$

(c) $\displaystyle\sum_{n=1} \frac{\sin(n+2) + \tan^{-1}(n)}{n^2}$

3. Sum the series or show that they diverge. Display your work carefully and completely.

(a) $\displaystyle\sum_{n=1}^{\infty} \frac{9 + (-3)^n}{5^{n-1}}$

(b) $\displaystyle\sum_{n=2}^{\infty} \frac{1}{(4n+1)(4n+5)}$

4. Compute the integral $\displaystyle\int_1^{\infty} \frac{x^2}{x^3+1}\, dx$

5. Determine whether the series diverges, converges absolutely, or converges conditionally. Support your answer with a clear argument with one or more tests.

(a) $\sum \dfrac{(-1)^n n^2}{n^{5/2} + \ln n + 2}$

(b) $\sum \dfrac{n^2 + 3}{(-e)^n}$