Math 170, Section 01, Exam 3, Sample
Saturday, November 14th, 2009

Name (PRINT clearly):

You will receive full credit only if you show all work and explain all steps.

1. Write $3.\overline{417}$ as a ratio of integers (you do not have to simplify your answer).

2. Find the sum of the series $\sum_{n=1}^{\infty} \frac{2}{n^2+3n}$.

3. Test the following series for convergence.

   (a) $\sum_{n=1}^{\infty} \frac{n^2+n+1}{\sqrt{n^5+3n}}$

   (b) $\sum_{n=1}^{\infty} \frac{1}{n^{1+1/n}}$

   (c) $\sum_{n=1}^{\infty} ne^{-4n^2}$

4. Decide whether the following series converge conditionally, converge absolutely, or diverge.

   (a) $\sum_{n=1}^{\infty} \frac{\cos(n\pi)}{n^{3/4}}$

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

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

5. Consider the infinite series

$$\frac{2}{5} - \frac{2\cdot 6}{5\cdot 8} + \frac{2\cdot 6\cdot 10}{5\cdot 8\cdot 11} - \frac{2\cdot 6\cdot 10\cdot 14}{5\cdot 8\cdot 11\cdot 14} - \cdots$$

   (a) Based on the pattern give a formula for the n^{th} term of the series.

   (b) Test the series for convergence.

6. Find the values of p for which the following series converges

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