Math 222 Quiz 5

October 7, 2010

Your Name: *Your Section:*

Instructions: Time is 20 minutes and the total score is 10 points. For #2 and the extra problems (if you do), you **CAN'T** *give only final answers, or you won't get points even if you are right, because they are mostly from homework.*

1. Choose **ANY ONE** of the two below.(2 points)
   • Which one is zero? (Please Circle.)
   A. $\lim_{n\to\infty} \frac{n}{(\ln n)^4}$ B. $\lim_{n\to\infty} \frac{100n^3}{e^{n/2}}$ C. $\lim_{n\to\infty} \frac{n!}{2^n}$ D. $\lim_{n\to\infty} \frac{n^n}{n!}$
   • When does $\sum_{n=1}^{\infty} \frac{1}{n^p}$ converge? (Circle one.)
   A. $p \geq 0$ B. $p < 0$ C. $p \geq 1$ D. $p > 1$

2. 1). Find the limit of **ANY ONE** of the two from Homework 5. (2 pts)
   $a_n = (\frac{1}{n})^{1/(\ln n)}$ $a_n = \sqrt[n]{n^2}$
   2). Find the **sum** of the Geometric Series from Homework 5:
   $\sum_{n=0}^{\infty} (\frac{2^{n+1}}{5^n})$ (3 pts)(Pay attention to the sub-index)
   Use the Integral Test to decide when the series from Homework 5 converges:
   $\sum_{n=2}^{\infty} \frac{1}{n(\ln n)^p}$ (3 pts)

(Bonus) Choose **ANY ONE** of the three below. (3pts)

• Does $\sum_{n=2}^{\infty} \frac{1}{\sqrt{n}\ln n}$ converge or not? (2 pts)

How about $\sum_{n=2}^{\infty} \frac{1}{n^p \ln n}$ $(0 < p \leq 1)$? (1 pt)

• Does $\sum_{n=1}^{\infty} \frac{(\ln n)^2}{n^3}$ converge or not? (2 pts)

How about $\sum_{n=1}^{\infty} \frac{(\ln n)^q}{n^p}$ $(p > 1, q > 1)$? (1 pt)

• Does $\frac{1}{1^2} + \frac{1}{2^3} + \frac{1}{3^2} + \frac{1}{4^3} + \ldots + \frac{1}{(2k-1)^2} + \frac{1}{(2k)^3} + \ldots$ converge? (1 pt)

$\lim_{n\to\infty} \frac{\sin n}{n}$ (1 pt)

$\lim_{n\to\infty} \frac{\sin(1/n)}{1/n}$ (1 pt)