

Math 1B Practice Midterm 2 Answers, July 27 2011

- The series $\sum_{n=1}^{\infty} \frac{1}{n^{1.2}}$; C (p -test);
 - The sequence $\frac{n}{n - \ln n}$; C (divide top and bottom by n , or use L'Hôpital);
 - The series $\sum_{n=1}^{\infty} \frac{n^n}{n!}$; D (divergence test);
 - The sequence $(\sin 2n)^n/n$; C ($|\sin 2n|$ bounded by 1);
 - The series $\sum_{n=1}^{\infty} \frac{2^n n^3}{5^n n^{10}}$; C (looks geometric with $r = 2/5$).

- The moment of a piece is the mass times x -distance. The mass is given to us as $f(x_i)\delta x\rho$, so the moment of a piece is $x_i f(x_i)\delta x\rho$, and so the total moment is $\sum_{i=1}^n x_i f(x_i)\rho\delta x$. The formula for the x -coordinate of the center of mass is

$$\frac{1}{A} \int_a^b x f(x) dx.$$

- The r chosen lies between L and 1. Thus, if $L < 1$ then $r < 1$ and if $L > 1$, then $r > 1$. A geometric series converges if and only if $|r| < 1$. The geometric series bounds a final piece of $\sum_{n=1}^{\infty} a_n$ from below when $1 < r < L$ and from above when $1 > r > L$, and so the Comparison Theorem then gives us that if $L < 1$ we have convergence and if $L > 1$ we have divergence.