Math 192 Series   Name & Box number:

1. Use any valid convergence/divergence test to determine whether the series is absolutely convergent, conditionally convergent, or divergent.

(a) $\sum_{n=2}^{\infty}\frac{1}{\ln n}$ (b) $\sum_{n=2}^{\infty}\frac{1}{\sqrt{n}-1}$ (c) $\sum_{n=1}^{\infty}\frac{(-1)^n}{\ln(n+1)}$ (d) $\sum_{n=1}^{\infty}\frac{3n}{\sqrt{2n^2+2}}$ (e) $\sum_{n=2}^{\infty}\frac{1}{4n+4^n}$

(f) $\sum_{n=1}^{\infty}\frac{3-\cos n}{n^{3/2}+2}$ (g) $\sum_{n=1}^{\infty}\frac{n^3+1}{2^n}$ (h) $\sum_{n=1}^{\infty}\frac{\sqrt{n^3+2n+1}}{n^3+3n+10}$ (i) $\sum_{n=2}^{\infty}\frac{3}{n^5+1}$ (j) $\sum_{n=2}^{\infty}\frac{2^n n^2}{n!}$

2. True or false. Explain why or why not.

(a) To prove that the series $\sum_{n=1}^{\infty} a_n$ converges, you should compute the limit $\lim_{n\to\infty} a_n$. If this limit is 0, then series converges.

(b) For a series $\sum_{n=1}^{\infty} a_n$, it was found that $\lim_{n\to\infty}\left|\frac{a_{n+1}}{a_n}\right| = 0$. The series is absolutely converegent.

(c) If the series $\sum_{n=1}^{\infty} a_n$ converges, then $\lim_{n\to\infty} a_n = 0$.

(d) An infinite series $\sum_{n=1}^{\infty} a_n$ converges if the limit of the sequence of partial sums comverges.

(e) There exists a convergent series $\sum_{n=1}^{\infty} a_n$ which satisfies $\lim_{n\to\infty} a_n \neq 0$.

(f) Let $a_n = \frac{n}{2n+1}$. This sequence a_n converges but the series $\sum_{n=1}^{\infty} a_n$ diverges.

(g) There is no divergent series $\sum_{n=1}^{\infty} a_n$ which satisfies $\lim_{n\to\infty} a_n = 0$.

(h) There is an infinite series which converges but does not converges absolutely.

(i) There is no divergent series which converges absolutely.