1) Do these series converge or diverge?

$$\sum_{n=1}^{\infty} \frac{(-0.5)^n}{n} = \sum_{n=1}^{\infty} \frac{(-1)^n \, .5^n}{n}$$

$$b_n = \frac{.5^n}{n}$$

$$\lim_{n\to\infty} \frac{.5^n}{n} \overset{L'H}{=} \lim_{n\to\infty} \frac{(.5)^n \ln(.5)}{1} = 0$$

$$f(x) = \frac{.5^x}{x} \qquad f' = \frac{x(.5)^x \ln(.5) - (.5)^x}{x^2}$$

$$= \frac{(x\ln(.5) - 1)(.5)^x}{x^2}$$

note: $x\ln(.5) - 1 < 0$ for $x > 0$

Thus $f' < 0$ and f is dec.

By A.S.T. the series converges.

Mar 22-10:11 PM

1) Do these series converge or diverge?

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

$$\lim_{n\to\infty} \frac{\ln(n)}{n} = \lim_{n\to\infty} \frac{\frac{1}{n}}{1} = 0$$

$$f(x) = \frac{\ln(x)}{x} \qquad f'(x) = \frac{x \cdot \frac{1}{x} - \ln(x)}{x^2}$$

$$= \frac{1 - \ln(x)}{x^2} < 0$$

for $x > e$

By the AST the series converges.

Mar 22-10:29 PM