Math 1172 HW #12

Section 11.5 # 4, 6, 8, 14

#4 $\displaystyle\sum_{n=3}^{\infty} (-1)^n \frac{1}{\ln(n)}$

dec WB $b_{n+1} \le b_n$

i.e. $\dfrac{1}{\ln(n+1)} \le \dfrac{1}{\ln(n)}$

Same as $\ln(n) \le \ln(n+1)$

This is true since ln of a bigger # gives a bigger answer.

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

So the series converges.

#6 $\displaystyle\sum_{n=0}^{\infty} \frac{(-1)^{n+1}}{\sqrt{n+1}}$

dec WB $b_{n+1} \le b_n$, i.e. $\dfrac{1}{\sqrt{n+1}} \le \dfrac{1}{\sqrt{n}}$

WB $\sqrt{n} \le \sqrt{n+1}$

This is true since sq. root of a bigger #

gives a bigger answer.

#8 $\sum (-1)^n \frac{n^2}{n^2+n+1}$

This one diverges since $\lim |a_n| \neq 0$:

$$\lim \left| (-1)^n \frac{n^2}{n^2+n+1} \right| = \lim \frac{n^2}{n^2+n+1} = \lim \frac{1}{1+1/n+1/n^2} = 1$$

Not 0, so it diverges.

#14 $\sum (-1)^{n-1} \arctan(n)$

$$\lim |a_n| = \lim_{n\to\infty} \arctan(n) = \pi/2$$

Not 0, so it diverges