Solutions

Math 21C Quiz 1
Section: 5:10-6:00 pm, TA: Arpy Mikaelian
Tuesday April 8, 2008

Problem 1

(5 points): Determine if the sequence $\frac{n\sqrt[n]{n}+\ln n}{n}$ converges or diverges. If it converges, find the limit.

$$\frac{n\cdot\sqrt[n]{n}+\ln n}{n} = \frac{n\cdot(n)^{1/n}+\ln n}{n}$$

$$= \frac{n\cdot 1+\ln n}{n} \quad \text{(by Thm. 5)}$$

$$= \frac{n}{n}+\frac{\ln n}{n}$$

$$= 1+\frac{\ln n}{n}$$

$$\Rightarrow \lim_{n\to\infty}\frac{n\sqrt[n]{n}+\ln n}{n} = \lim_{n\to\infty}\left(1+\frac{\ln n}{n}\right)$$

$$= 1+0, \quad (\text{since } \lim_{n\to\infty}\ln(n)=1)$$

$$= 1$$

$\Rightarrow$ Converges to 1