10 – 19

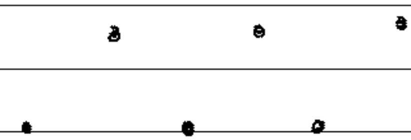
Note Title 10/19/2007

Ex $a_n = \frac{1}{2^n}$ $\lim_{n\to\infty} a_n = \lim_{x\to\infty} \frac{1}{2^x} = 0$ converges

Ex $a_n = \frac{\sqrt{n}}{\sqrt{n}+1}$ $\lim_{n\to\infty} a_n = \lim_{x\to\infty} \frac{\sqrt{x}}{\sqrt{x}+1}$ $\frac{\infty}{\infty}$

$\overset{L'H}{=} \lim_{x\to\infty} \frac{\frac{1}{2}x^{-1/2}}{\frac{1}{2}x^{-1/2}} = 1$ converges

Ex $a_n = \cos(n\pi)$ $-1, 1, -1, 1, \ldots$



diverges

Ex $a_n = \dfrac{\sin(2n)}{n^2}$ $\qquad \lim_{x\to\infty} \dfrac{\sin(2x)}{x^2}$?

But $-1 \le \sin(2n) \le 1$, so

$$\frac{-1}{n^2} \le \frac{\sin(2n)}{n^2} \le \frac{1}{n^2}$$

$$\downarrow \qquad\qquad \downarrow$$

$$0 \qquad\qquad 0 \quad \text{as } n \to \infty$$

$$\therefore \frac{\sin(2n)}{n^2} \to 0 \quad \text{converges}$$