9.3

Integral Test

$$\sum_{n=1}^{\infty}\left[\frac{1}{n^2+1}\right] \qquad \text{(is always positive, continuous, and decreases as } n \text{ grows)}$$

$$\int_1^{\infty}\left[\frac{1}{x^2=1}\right]dx = \lim_{a\to\infty}[\arctan x]_1^a = \lim_{a\to\infty}[\arctan a - \arctan 1] = \frac{\pi}{2} - \frac{\pi}{4} = \frac{\pi}{4} \therefore \sum_{n=1}^{\infty}\left[\frac{1}{n^2+1}\right]$$

p-series

$$\sum_{n=1}^{\infty}\frac{1}{\sqrt{n}} \text{ diverges} \qquad (p = \tfrac{1}{2} \ \leq 1 \therefore \text{ diverges})$$

$$\sum_{n=1}^{\infty}\frac{1}{n} \text{ diverges} \qquad (p = 1 \leq 1 \therefore \text{ diverges})$$