Key

QUIZ 11

For each of the following series identity a convergence test (which will not fail) to use to determine whether that series converges or diverges. Note: in some cases, there may be several tests that will work. Then use the test to determine whether the series converges or diverges.

1. (2 points)

$$\sum_{n=0}^{\infty} \frac{2}{3^{2n-1}} = \underbrace{6}_{n=0} + \underbrace{2/3}_{n=1} + \underbrace{\frac{2}{27}}_{n=2} + \dots \qquad a = 6 \quad r = 1/9$$

geometric

Converges b/c $-1 < 1/9 < 1$

2. (2 points)

$$\sum_{n=1}^{\infty} \frac{5}{\sqrt{n}} = \sum_{n=1}^{\infty} \frac{5}{n^{1/2}} \qquad p = 1/2 < 1$$

P-series

Diverges

3. (3 points)

$$\sum_{n=0}^{\infty} \frac{5n^2-3}{n^5+1} < \sum_{n=0}^{\infty} \frac{5n^2}{n^5+1} < \sum_{\substack{n=0 \\ (n \neq 0)}}^{\infty} \frac{5n^2}{n^5} = \sum_{\substack{n=0 \\ (n \neq 0)}}^{\infty} \frac{5}{n^3} < \infty$$

p-series $p = 3 > 1$ Converges

DCT

Converges

4. (3 points)

$$\sum_{n=0}^{\infty} \frac{2^n}{n!}$$

$$L = \lim_{n\to\infty} \left| \frac{\left(\frac{2^{n+1}}{(n+1)!}\right)}{\left(\frac{2^n}{n!}\right)} \right| = \lim_{n\to\infty} \frac{2^{n+1}}{(n+1)!} \cdot \frac{n!}{2^n}$$

$$= \lim_{n\to\infty} \frac{2}{n+1} = 0 < 1$$

Ratio

Converges