MATH 242 - Quiz 8 REMIX

04/04/2024

1. **[5 pts]** Use the Ratio Test to determine convergence/divergence:

$$\sum_{n=1}^{\infty} \frac{n^2}{(2n-1)!}$$

$$\lim_{n\to\infty} \frac{(n+1)^2}{(2n+1)!} \cdot \frac{(2n-1)!}{n^2}$$

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

Converges

2. [**5 pts**] Use the Root Test to determine convergence/divergence:

$$\sum_{n=1}^{\infty} \frac{n^n}{3^{2n-1}}$$

$$= 3 \sum_{n=1}^{\infty} \frac{n^n}{3^{2n}}$$

$$= 3 \sum_{n=1}^{\infty} \frac{n^n}{9^n}$$

$$\sqrt[n]{\frac{n^n}{9^n}} = \frac{n}{9} \to \infty \quad \text{diverges}$$