

Math 276 Discussion Worksheet 9

1. Evaluate the following limits.

$$\text{a. } \lim_{n \rightarrow \infty} (-1)^n \frac{n}{\sqrt{n+1}} \sin\left(n\pi + \frac{1}{\sqrt{n}}\right) \quad \text{b. } \lim_{n \rightarrow \infty} \sqrt[n]{n+1} \left(1 + \frac{1}{n^2}\right)^n$$

2. Determine the convergence or divergence of the following series.

$$\text{a. } \sum_{n=1}^{\infty} \frac{(\log n)^3}{\sqrt{n^3+1}} \quad \text{b. } \sum_{n=1}^{\infty} \sqrt{n} \tan\left(\frac{1}{n^2}\right) \quad \text{c. } \sum_{n=0}^{\infty} e^{-\sqrt{n}} \quad \text{d. } \sum_{n=1}^{\infty} (-1)^{n^2} \frac{1}{\log n}$$

3. Determine the convergence or divergence of the following improper integrals.

$$\text{a. } \int_{10}^{\infty} \frac{1}{x(\log x)(\log \log x)^s} dx \quad \text{b. } \int_0^1 \frac{1}{\log x} dx \quad \text{c. } \int_0^1 \frac{1}{\sqrt{x(1-x)}} dx$$

4. Determine the radius of convergence of the following power series.

$$\text{a. } \sum_{n=1}^{\infty} \frac{n^n}{(2n)!} x^n \quad \text{b. } \sum_{n=1}^{\infty} \frac{n^2}{2^n} x^n \quad \text{c. } \sum_{n=1}^{\infty} \sin\left(n\frac{\pi}{2}\right) \frac{x^n}{n}$$