

CALCULUS I
AUTUMN 2015 - HOMEWORK 5

1. Which series converge and which diverge?

$$\text{a) } \sum_{n=0}^{\infty} \cos(n\pi) \quad \text{b) } \sum_{n=0}^{\infty} e^{-2n} \quad \text{c) } \sum_{n=1}^{\infty} \left(1 - \frac{1}{n}\right)^n$$

2. Use the integral test to determine if the below series converge.

$$\text{a) } \sum_{n=1}^{\infty} \frac{1}{n^2} \quad \text{b) } \sum_{n=2}^{\infty} \frac{\ln(n^2)}{n}$$

3. Use the comparison test to determine if the below series converge or diverge.

$$\text{a) } \sum_{n=2}^{\infty} \frac{1}{\sqrt{n} - 1} \quad \text{b) } \sum_{n=1}^{\infty} \frac{\cos^2 n}{n^{3/2}}$$

4. Use the limit comparison test to determine if the below series converge or diverge.

$$\text{a) } \sum_{n=1}^{\infty} \frac{n-2}{n^3 - n^2 + 3} \quad \text{b) } \sum_{n=1}^{\infty} \frac{1}{\ln n}$$

5. Use the ratio test to determine if the below series converge or diverge.

$$\text{a) } \sum_{n=2}^{\infty} \frac{3^{n+2}}{\ln n} \quad \text{b) } \sum_{n=1}^{\infty} \frac{n^2 (n+1)!}{n! 3^{2n}}$$

6. Use the root test to determine if the below series converge or diverge.

$$\text{a) } \sum_{n=1}^{\infty} \sin^n \left(\frac{1}{\sqrt{n}} \right) \quad \text{b) } \sum_{n=1}^{\infty} \frac{n^2 (n+1)!}{n! 3^{2n}}$$