

MA 114 Worksheet # 8: Review for Exam 1

1. Evaluate $\int_{-1}^{\infty} e^{-x} dx$

2. Evaluate $\int_1^2 \frac{dx}{x \ln(x)}$.

3. Evaluate $\int_3^6 \frac{x}{\sqrt{x-3}} dx$.

4. Determine the limit of the sequence or state that the sequence diverges.

(a) $a_n = \sqrt{n+3} - \sqrt{n}$

(b) $b_n = \frac{\cos(n)}{n}$

(c) $c_n = \frac{e^n + (-3)^n}{5^n}$

(d) $d_n = n^{1/n}$

[HINT: Verify that $x^{1/x} = e^{\frac{\ln(x)}{x}}$ and use l'Hospital's Rule.]

5. Determine whether or not $\sum_{n=2}^{\infty} \left(1 - \sqrt{1 - \frac{1}{n^2}}\right)$ converges.

6. Evaluate $\sum_{n=3}^{\infty} \frac{1}{n(n+3)}$.

[HINT: Use $\frac{1}{n(n+3)} = \frac{1}{3} \left(\frac{1}{n} - \frac{1}{n+3}\right)$.]

7. Find a value of N such that S_N approximates the series with an error of at most 10^{-5} where

$$S = \sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n(n+2)(n+3)}$$

8. Determine convergence or divergence.

(a) $\sum_{n=0}^{\infty} 5^{-n}$.

(b) $\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n^2+1}}$.

(c) $\sum_{n=1}^{\infty} n e^{-n^2}$.

(d) $\sum_{n=1}^{\infty} \frac{e^n}{n!}$.

(e) $\sum_{n=1}^{\infty} \frac{e^n}{n^n}$.

9. Determine the radius of convergence of the following series.

(a) $\sum_{n=0}^{\infty} \frac{2^n x^n}{n!}$

$$(b) \sum_{n=2}^{\infty} \frac{(2x-3)^n}{n \ln(n)}$$