MTH 1126 - Test #4

SPRING 2023

Pat Rossi Name _____

Show CLEARLY how you arrive at your answers.

In Exercises 1-2, Determine convergence/divergence. If the integral converges, find its value.

1. $\int_5^\infty \frac{1}{(x-1)^{\frac{1}{2}}} dx =$

2. $\int_2^6 \frac{1}{(x-2)^{\frac{3}{2}}} dx =$

3. Determine convergence/divergence of the sequence whose n^{th} term is given by:

   $a_n = (-1)^{n+1}\,\frac{1}{n}$. (i.e., Determine convergence/divergence of the sequence $\left\{(-1)^{n+1}\,\frac{1}{n}\right\}_{n=1}^{\infty} = \left\{1, -\frac{1}{2}, \frac{1}{3}, -\frac{1}{4}, \frac{1}{5}, -\frac{1}{6}\ldots\right\}$.)

4. Determine convergence/divergence of the given series. (Justify your answer!) **If the series converges, determine its sum.**

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

In Exercises 5-6, determine convergence/divergence of the given series. (Justify your answers!) **If the series converges, determine its sum.**

5. $1 + \frac{4}{5} + \frac{16}{25} + \frac{64}{125} + \ldots + \left(\frac{4}{5}\right)^n + \ldots$

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

In Exercises 7-9, determine convergence/divergence of the given series. (Justify your answers!)

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

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

9. Determine convergence/divergence of the given series. (Justify your answer!)

   $\sum_{n=1}^{\infty} (-1)^{n+1} \frac{1}{2n} = \frac{1}{2} - \frac{1}{4} + \frac{1}{6} - \frac{1}{8} + \dots$

For exercises 10-11, choose one. (You can do the other for extra credit. (10 points))

10. Determine convergence/divergence of the given series. (Justify your answer!)

$$\sum_{n=1}^{\infty} \left(\frac{1}{\sqrt{2n+1}}\right)^n$$

11. Determine convergence/divergence of the given series. (Justify your answer!)

$$\sum_{n=1}^{\infty} \frac{5^{2n}}{n!}$$