MTH 1126 - Test #4

Spring 2024 - 9am Class

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. $\int_5^{\infty} \frac{1}{(x-1)^{\frac{3}{2}}} dx =$

2. $\int_5^{14} \frac{1}{(x-5)^{\frac{1}{2}}} dx =$

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

$$a_n = \frac{2n}{n+1}.$$

(i.e., Determine convergence/divergence of the sequence:

$$\left\{\frac{2n}{n+1}\right\}_{n=1}^{\infty} = \left\{1, \frac{4}{3}, \frac{3}{2}, \frac{8}{5}, \frac{5}{3}, \frac{12}{7}, \ldots, \frac{2n}{n+1}, \ldots\right\}.)$$

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

$\sum_{n=3}^{\infty} \frac{4}{n^2-4} = \frac{4}{5} + \frac{4}{12} + \frac{4}{21} + \ldots$

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

5. $1 + \frac{2}{5} + \frac{4}{25} + \frac{8}{125} + \ldots + \left(\frac{2}{5}\right)^n + \ldots$

6. $\sum_{n=1}^{\infty} \frac{n}{5n+1} =$

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

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

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

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

   $\sum_{n=1}^{\infty} (-1)^{n+1} \frac{1}{2n+1} = \frac{1}{3} - \frac{1}{5} + \frac{1}{7} - \frac{1}{9} + \dots$

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

$$\sum_{n=1}^{\infty} \left(\frac{n+3}{5n+1}\right)^n$$

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

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