

**MTH 1126 - Test #4 - Version 2**  
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Name \_\_\_\_\_

**Show CLEARLY how you arrive at your answers.**

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

1.  $\int_2^{\infty} \frac{1}{(x-1)} dx =$

2.  $\int_0^3 \frac{1}{\sqrt{3-x}} dx =$

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

$$a_n = \frac{1+(-1)^n}{n}. \text{ (i.e., Determine convergence/divergence of the sequence } \left\{ \frac{1+(-1)^n}{n} \right\}_{n=1}^{\infty} = \{0, 1, 0, \frac{1}{2}, 0, \frac{1}{3}, 0, \frac{1}{4}, \dots\} \text{.)}$$

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

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

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

5.  $1 + \frac{2}{5} + \frac{4}{25} + \frac{8}{125} + \frac{16}{625} + \dots$

6.  $\sum_{n=1}^{\infty} \frac{n^2+2n}{n^2+4n+3} =$

In Exercises 7-8, determine convergence/divergence of the given series. (Justify your answers!)

$$7. \sum_{n=4}^{\infty} \frac{1}{n^{\frac{3}{2}-1}}$$

$$8. \sum_{n=1}^{\infty} \frac{1}{n+3}$$

For exercises 9-10, choose one. (You can do the other for extra credit. (10 points))

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

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

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

$$\sum_{n=1}^{\infty} \frac{3^n}{n!}$$

**Extra** Wow! (10 points)

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

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