

Instructor: Sal Barone

Name: \_\_\_\_\_

GT username: \_\_\_\_\_

1. No books or notes are allowed.
2. No electronic devices are allowed.
3. Show all work and fully justify your answer to receive full credit.
4. Please BOX your answers.
5. The exam consists of 105 points but your score will be out of 100, there is a 5 pt. bonus question at the end.
6. Good luck!

Page	Max. Possible	Points
1	16	
2	38	
3	30	
4	21	
Total	105	



1. Find the value of the series.

(16 pts.)

$$\sum_{n=2}^{\infty} \frac{2^{2n-2}}{5 \cdot 10^{n-2}}$$

2. Do the sequences  $\{a_n\}$  with  $n \geq 0$  converge or diverge? If they converge, find the limit. Justify your answers. (7 pts. each)

(a)  $a_n = \frac{(-1)^n}{\sqrt{n} + 1}$

(b)  $a_n = \frac{n^2}{(2n + 1)(2n + 2)}$

3. Determine if the given series converge or diverge. Fully justify your answer using any of the convergence tests from class in order to receive full credit. (12 pts. each)

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

(b)  $\sum_{n=2}^{\infty} \frac{1}{n (\ln n)^{3/2}}$

4. Determine if the given alternating series converges absolutely, conditionally, or diverges. Fully justify your answer using any of the convergence tests from class in order to receive full credit. (15 pts.)

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

5. Find the interval and radius of convergence of the power series. (15 pts.)

$$\sum_{n=2}^{\infty} \left( \frac{n}{n+1} \right) \frac{(x+3)^n}{4^n}$$

6. For which value of  $p$  does the following series converge to 16.

(16 pts.)

$$\sum_{n=0}^{\infty} \frac{14}{4^{pn}}$$

**Bonus (5 pts.):** How many terms must be used to determine the sum of the entire series with an error of less than 0.08?

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