

Name: _____

ID Number: _____

Section Number: _____

Section	Instructor	Day/Time	Section	Instructor	Day/Time
1	Zhao	MWF 10:10	9	Sunukjian	TuThu 11:30
2	Zhao	MWF 9:05	10	Benincasa	TuThu 4:00
3	Nikolaou	MWF 11:15	11	Farelli	MWF 11:15
4	Nikolaou	MWF 12:20	12	Bates	MWF 12:20
5	Wen	MW 2:30	13	Hart	MWF 1:25
6	Wen	MW 4:00	15	Le	TuThu 11:30
7	Yaping	TuThu 8:30	16	Johnson	TuThu 1:00
8	Lowell	TuThu 10:00			

- No papers or notes may be used. You may use a calculator on this exam.
- Please don't just give an answer. Clearly explain how you get it, providing appropriate mathematical details. **An answer of 'convergent' or 'divergent' with no supporting work will be awarded zero points.**
- This is a 2 hour exam.

Question	Grade
MC Total (Out of 25)	
6 (Out of 20)	a. b.
7 (Out of 15)	a. b.
8 (Out of 20)	a. b.
9 (Out of 20)	a. b.
Total (Out of 100)	

Multiple Choice Section: Choose the one option that best answers the question. There is no partial credit for questions 1-5.

1. [5 points] For what values of r does the following integral converge?

$$\int_r^{\infty} \frac{1}{x^2} dx$$

- (A) For all values of r .
- (B) $r < 0$.
- (C) $r \geq 0$.
- (D) $r > 0$.

2. [5 points] Which one of the following series represents the repeating decimal 0.454545...?

- (A) $\sum_{n=1}^{\infty} 45 \left(\frac{1}{10}\right)^{n-1}$
- (B) $\sum_{n=1}^{\infty} \frac{45}{100} \left(\frac{1}{100}\right)^{n-1}$
- (C) $\sum_{n=1}^{\infty} 45 \left(\frac{1}{100}\right)^{n-1}$
- (D) $\sum_{n=1}^{\infty} \frac{45}{100} \left(\frac{1}{100}\right)^n$

3. [5 points] Which of the following statements is false?

- (A) If the series $\sum_{n=1}^{\infty} a_n$ converges, then $\lim_{n \rightarrow \infty} a_n = 0$.
- (B) If $\lim_{n \rightarrow \infty} a_n = 0$, then the series $\sum_{n=1}^{\infty} a_n$ converges.
- (C) If $\lim_{n \rightarrow \infty} a_n \neq 0$, then the series $\sum_{n=1}^{\infty} a_n$ diverges.
- (D) If $\lim_{n \rightarrow \infty} a_n = 1$, then the sequence $\{a_n\}_{n=1}^{\infty}$ converges.

4. [5 points] Given the following series, which of the following converge?

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

II. $\sum_{n=1}^{\infty} \frac{5}{\sqrt{n}}$

III. $\sum_{n=1}^{\infty} \frac{n+8}{14n+9}$

(A) I, II, and III

(B) I and II

(C) I only

(D) II and III

5. [5 points] What is the sum of the series $\sum_{n=0}^{\infty} \frac{3^{n-1}}{5^n}$?

(A) $\frac{3}{5}$

(B) $\frac{1}{2}$

(C) $\frac{5}{6}$

(D) 1

Please fill in your letter answer for questions 1-5 below:

(1) _____ (2) _____ (3) _____ (4) _____ (5) _____

Free Response Portion: Show all work for each of the following questions. Partial credit may be awarded for questions 6-10. You will receive no credit for an answer of “convergent” or “divergent” without supporting work.

6 (a). [10 points] Evaluate the following integral.

$$\int \frac{x + 1}{2x^2 + x - 3} dx$$

6 (b). [10 points] Does the following integral converge or diverge? If it converges, what does it converge to?

$$\int_2^3 \frac{3}{(x-2)^2} dx$$

7 (a). [5 points] Does the series converge or diverge? State which test you used and clearly show that the series meets the conditions to use this test.

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

7 (b). [10 points] Does the series converge or diverge? State which test you used and clearly show that the series meets the conditions to use this test.

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

8 (a). [10 points] Does the series converge or diverge? State which test you used and clearly show that the series meets the conditions to use this test.

$$\sum_{n=1}^{\infty} 6n^2 e^{-n^3}$$

8 (b). [10 points] Does the series converge or diverge? State which test you used and clearly show that the series meets the conditions to use this test.

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

9 (a). [10 points] Does the series absolutely converge, conditionally converge, or diverge? State which test you used and clearly show that the series meets the conditions to use this test.

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

9 (b). [10 points] Does the series absolutely converge, conditionally converge, or diverge? State which test you used and clearly show that the series meets the conditions to use this test.

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

This page is intentionally left blank for additional work.