Name: _______________________________ Date:_______________ **Corrective Assignment**

Mid-Unit 10 CA – Infinite Sequences and Series

1. The infinite series $\sum_{n=1}^{\infty} a_n$ has nth partial sum $S_n = \frac{4^n - 1}{4^{n+1}}$ for $n \geq 1$. What is the sum of the series?

2. Which of the following series diverge?

I. $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n^2(n+3)}$ II. $\displaystyle\sum_{n=1}^{\infty} \frac{n^2 2^{n+1}}{3^n}$ III. $\displaystyle\sum_{n=1}^{\infty} \frac{n!}{n4^n}$

(A) I only (B) II only (C) III only (D) I and II only (E) I, II, and III

---

3. The nth-Term Test can be used to determine divergence for which of the following series?

I. $\displaystyle\sum_{n=1}^{\infty} \frac{2n+1}{1-n}$ II. $\displaystyle\sum_{n=0}^{\infty} 5\left(\frac{2}{3}\right)^n$ III. $\displaystyle\sum_{n=1}^{\infty} \frac{2n(n-1)^2}{4n^2 - 3n^3}$

(A) I and II only (B) II and III only (C) I and III only (D) I, II, and III

---

4. If b and t are real numbers such that $0 < |t| < |b|$, what is the sum of $b^2 \sum_{n=0}^{\infty} \left(\frac{t^2}{b^2}\right)^n$?

5. Explain why the Integral Test does not apply to the series $\sum_{n=1}^{\infty} \frac{3}{n^{-2}}$.

6. For what values of p will the infinite series $\sum_{n=1}^{\infty} \frac{1}{n^{3p+1}}$ converge?

7. **Calculator active.** Which of the following series matches the following sequence of partial sums 0.1667, $0.3333,\ 0.4833,\ 0.6167,\ 0.7357, \ldots$?

(A) $\sum_{n=1}^{\infty} \frac{1}{(n+1)(n+2)}$ (B) $\sum_{n=1}^{\infty} \frac{n}{(n+1)(n+2)}$ (C) $\sum_{n=1}^{\infty} \frac{n+1}{n+2}$ (D) $\sum_{n=1}^{\infty} \frac{1}{(n+1)(n+3)}$

---

8. For what values of x is the series $\sum_{n=1}^{\infty} \frac{(7x-3)^n}{n}$ conditionally convergent?

(A) $x = \frac{2}{7}$ (B) $x = \frac{4}{7}$ (C) $x > \frac{4}{7}$ (D) $x < \frac{2}{7}$

9. Which of the following series can be used with the Limit Comparison Test to determine whether the series $\displaystyle\sum_{n=1}^{\infty} \frac{3n+2}{n^3-2n}$ converges or diverges?

(A) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n}$ (B) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n^2}$ (C) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n^3}$ (D) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n^3-2n}$

---

10. Verify that the infinite series $\displaystyle\sum_{n=1}^{\infty} \frac{7^{n+1}-2}{7^{n+2}}$ diverges by using the nth-Term Test for Divergence. Show the value of the limit.

11. Which of the following statements about the series $\sum_{n=1}^{\infty} \frac{2^n}{9^n+n}$ is true?

(A) The series diverges by the nth Term Test.

(B) The series diverges by comparison with $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n}$.

(C) The series converges by comparison with $\displaystyle\sum_{n=1}^{\infty} \frac{2^n}{9^n}$.

(D) The series converges by comparison with $\displaystyle\sum_{n=1}^{\infty} \frac{1}{9^n}$.

---

12. Which of the following series converge by the Alternating Series Test?

I. $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n}$ II. $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{\sqrt{n}}$ III. $\displaystyle\sum_{n=1}^{\infty} (-1)^n \left(\frac{\pi}{e}\right)^n$

A. I only B. I and II only C. I and III only D. I, II, and III

13. Which of the following series is absolutely convergent?

I. $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{\sqrt[3]{n^4}}$ II. $\sum_{n=1}^{\infty} \frac{(-1)^n}{n!}$ III. $\sum_{n=1}^{\infty} \frac{(-1)^n}{n}$

(A) I only   (B) I and II only   (C) I and III only   (D) I, II, and III

---

14. Use the Integral test to determine if the series $\sum_{n=1}^{\infty} \frac{3n^2}{n^3+1}$ converges or diverges.

15. Which of the following statements are true about the series $\sum_{n=1}^{\infty} (-1)^{n+1} \frac{n+1}{n}$?

I. $a_{n+1} \leq a_n$ for all $n \geq 1$.
II. $\lim_{n\to\infty} a_n \neq 0$
III. The series converges by the Alternating Series Test

A. I only   B. I and II only   C. II and III only   D. I, II, and III

16. What are all values of $x > 0$ for which the series $\sum_{n=1}^{\infty} \frac{n^2 x^{n+1}}{7^n}$ converges.

17. Which of the following is a convergent p-series?

(A) $\sum_{n=1}^{\infty} n^4$ (B) $\sum_{n=1}^{\infty} \left(\frac{1}{2}\right)^n$ (C) $\sum_{n=1}^{\infty} \frac{1}{\sqrt[3]{n^2}}$ (D) $\sum_{n=1}^{\infty} \left(\frac{1}{n^3}\right)^{\frac{1}{2}}$

---

18. Consider the series $\sum_{n=1}^{\infty} a_n$. If $\frac{a_{n+1}}{a_n} = \frac{1}{2}$ for all integers $n \geq 1$, and $\sum_{n=1}^{\infty} a_n = 64$, then $a_1 = ?$

Answers to Mid-Unit 10 Corrective Assignment

1. $\frac{1}{4}$	2. C	3. C	4. $\frac{b^4}{b^2 - t^2}$	5. $f(n)$ is not a decreasing function for $n \geq 1$.
6. $p > 0$	7. B	8. A	9. B	
10. Diverges by nth-Term Test, $\lim_{n\to\infty} a_n = \frac{1}{7}$	11. C	12. B	13. B	
14. $\int_1^{\infty} f(x)\,dx = \infty$, Series Diverges	15. B	16. $x < 7$	17. D	18. 32