

Calc 2 Test # 3 BONUS Review

G. Buthusiem

Write the first four elements of the sequence.

1. $\left(\frac{1}{3}\right)^n$

Find a formula for the nth term of the sequence.

2. $1, -\frac{1}{4}, \frac{1}{9}, -\frac{1}{16}, \frac{1}{25}$ (reciprocals of squares with alternating signs)

Use the nth-Term Test for divergence to show that the series is divergent, or state that the test is inconclusive.

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

Determine if the series converges or diverges; if the series converges, find its sum.

4. $\sum_{n=0}^{\infty} \frac{1}{(\sqrt{6})^n}$

Use the integral test to determine whether the series converges.

5. $\sum_{n=1}^{\infty} \frac{6n}{n^2+5}$

Provide an appropriate response.

6. Which of the following is not a condition for applying the integral test to the sequence $\{a_n\}$, where $a_n = f(n)$?

- I. $f(x)$ is everywhere positive
- II. $f(x)$ is decreasing for $x \geq N$
- III. $f(x)$ is continuous for $x \geq N$

Use the Ratio Test to determine if the series converges or diverges.

7. $\sum_{n=1}^{\infty} \frac{9^n}{n!}$

Use the Root Test to determine if the series converges or diverges.

8. $\sum_{n=1}^{\infty} \left(\frac{1}{n^2} - \frac{1}{n^6}\right)^n$

Determine convergence or divergence of the series.

9. $\sum_{n=1}^{\infty} \frac{10}{n^{1/4}}$

10. $\sum_{n=1}^{\infty} \frac{5n^2+5}{n^4+7n+1}$

Determine if the series converges absolutely, converges, or diverges.

$$11. \sum_{n=1}^{\infty} (-1)^n \left(\frac{3n^3 + 3}{7n^3 + 4} \right)$$

$$12. \sum_{n=1}^{\infty} \frac{(-1)^n}{6n^{1/3} + 1}$$

$$13. \sum_{n=1}^{\infty} (-4)^{-n}$$

Find the interval of convergence of the series.

$$14. \sum_{n=0}^{\infty} (x - 9)^n$$

$$15. \sum_{n=0}^{\infty} \frac{(x - 6)^n}{n^5 3^n}$$

Find the first four nonzero terms in the Maclaurin series for the function.

$$16. e^{-6x}$$

$$17. \ln(1 + x^3)$$

Answer Key

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1. $\frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \frac{1}{81}$

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

3. diverges

4. Converges; $\frac{6 + \sqrt{6}}{5}$

5. diverges

6. I only

7. Converges

8. Converges

9. Diverges

10. Converges

11. Diverges

12. Converges conditionally

13. converges absolutely

14. $8 < x < 10$

15. $3 \leq x \leq 9$

16. $1 - 6x + \frac{36x^2}{2!} + \frac{-216x^3}{3!} + \dots$

17. $x^3 - \frac{1}{2}x^6 + \frac{1}{3}x^9 - \frac{1}{4}x^{12} + \dots$