AP_Calculus_BC_CH11_Exam

AP_Calculus_BC_CH11_Exam - 17 questions

17 Questions | 45 min

1. Find the limit of the sequence $a_n = \dfrac{5n^2 - 3n}{2n^2 + n + 4}$.

(A) 0

(B) $\dfrac{5}{2}$

(C) $\dfrac{5}{4}$

(D) Does not exist

2. Which of the following sequences converges?

(A) $a_n = (-1)^n$

(B) $a_n = \dfrac{(-1)^n}{n}$

(C) $a_n = \sin(n)$

(D) $a_n = n\sin(n)$

3. Find the sum of the series $\sum_{n=1}^{\infty} \frac{3}{4^n}$.

(A) $\frac{3}{4}$

(B) 1

(C) $\frac{4}{3}$

(D) 3

4. The series $\sum_{n=1}^{\infty} \frac{1}{n^p}$ converges if and only if:

(A) $p > 0$ (B) $p \geq 1$ (C) $p > 1$ (D) $p \geq 2$

5. Using the Integral Test, determine the convergence of $\sum_{n=2}^{\infty} \frac{1}{n \ln n}$.

(A) Converges (B) Diverges (C) Inconclusive (D) Cannot apply

6. Using the Comparison Test, $\sum_{n=1}^{\infty} \frac{1}{n^2+1}$:

(A) Converges by comparison with $\sum \frac{1}{n^2}$

(B) Diverges by comparison with $\sum \frac{1}{n}$

(C) Converges by comparison with $\sum \frac{1}{n}$

(D) Cannot be determined by comparison

7. The alternating series $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n^2}$ is:

(A) Absolutely convergent

(B) Conditionally convergent

(C) Divergent

(D) Cannot be determined

8. Use the Ratio Test on $\sum_{n=1}^{\infty} \frac{n^2}{2^n}$. The series:

(A) Converges, $L = \frac{1}{2}$

(B) Diverges, $L = 2$

(C) Inconclusive, $L = 1$

(D) Converges, $L = 0$

9. The radius of convergence for $\sum_{n=0}^{\infty} \frac{x^n}{n!}$ is:

(A) $R = 0$ (B) $R = 1$ (C) $R = e$ (D) $R = \infty$

10. Find the interval of convergence for $\sum_{n=1}^{\infty} \frac{x^n}{n}$.

(A) $(-1, 1)$ (B) $[-1, 1)$ (C) $(-1, 1]$ (D) $[-1, 1]$

11. The Maclaurin series for $\dfrac{1}{1-x}$ is:

(A) $\sum_{n=0}^{\infty} x^n$

(B) $\sum_{n=0}^{\infty} (-1)^n x^n$

(C) $\sum_{n=1}^{\infty} x^n$

(D) $\sum_{n=0}^{\infty} n x^n$

12. The Maclaurin series for e^x is:

(A) $\sum_{n=0}^{\infty} x^n$

(B) $\sum_{n=0}^{\infty} \dfrac{x^n}{n!}$

(C) $\sum_{n=1}^{\infty} \dfrac{x^n}{n}$

(D) $\sum_{n=0}^{\infty} \dfrac{x^n}{n}$

13. The coefficient of x^3 in the Taylor series for $\sin x$ centered at 0 is:

(A) $\dfrac{1}{3}$

(B) $-\dfrac{1}{3}$

(C) $\dfrac{1}{6}$

(D) $-\dfrac{1}{6}$

14. Using $T_2(x)$ for $\cos x$ at $a = 0$, approximate $\cos(0.1)$:

(A) 0.990 (B) 0.995 (C) 1.000 (D) 0.985

15. Which test is BEST for $\displaystyle\sum_{n=1}^{\infty} \frac{3^n}{n!}$?

(A) Integral Test (B) Comparison Test (C) Ratio Test (D) Root Test

16. Consider the series $\sum_{n=1}^{\infty} \frac{n}{3^n}$.

(a) Use the Ratio Test to determine whether the series converges or diverges. Show all steps.

(b) If the series converges, explain why absolute convergence and conditional convergence are the same in this case.

(c) Using the geometric series formula $\sum_{n=0}^{\infty} x^n = \frac{1}{1-x}$ for $|x| < 1$, differentiate both sides and find a closed form for $\sum_{n=1}^{\infty} nx^{n-1}$.

17. Let $f(x) = \ln(1+x)$.

(a) Find the Maclaurin series for $f(x) = \ln(1+x)$ by integrating the series for $\frac{1}{1+x}$.

(b) Determine the interval of convergence for the series found in part (a). Be sure to check the endpoints.

(c) Use the first four nonzero terms of the series to approximate $\ln(1.5)$. Then use the Alternating Series Estimation Theorem to find an upper bound for the error in your approximation.