Name

1. If x and y are positive real numbers, which of the following conditions guarantees that the infinite $\sum_{n=1}^{\infty} (x) (x)^{n}$

series
$$\sum_{n=0}^{\infty} \left(\frac{x}{y}\right) \left(\frac{x}{y^2}\right)$$
 converges?
(A) $x > y$
(B) $x > y^2$
(C) $x < y$

(D)
$$x < y^2$$

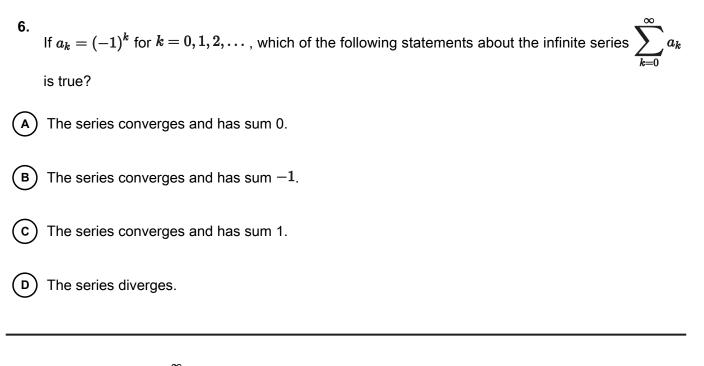
2. Let x be a real number. Which of the following statements about the infinite series ∑_{k=0}[∞] e^{kx} is true?
(A) The sum of the series is 1/(1-e^x) if x < 0.
(B) The sum of the series is 1/(1-e^x) if x > 0.
(C) The sum of the series is e^x/(1-e^x) if x < 0.

- D The sum of the series is $\frac{e^x}{1-e^x}$ if x > 0.
- 3. Let f be the function defined by $f(x) = \frac{1}{1-x}$. Which of the following is the Maclaurin series for f'?



- (A) $\sum_{n=1}^{\infty} x^{n-1}$ (B) $\sum_{n=1}^{\infty} nx^{n-1}$ (c) $\sum_{n=1}^{\infty} (-1)^n x^{n-1}$ (d) $\sum_{n=1}^{\infty} (-1)^n nx^{n-1}$
- 4. The second-degree Taylor polynomial for $f\left(x
 ight)=rac{\cos x}{1-x}$ about x=0 is
- (A) $1 + \frac{x^2}{2}$
- (B) $1 + x^2$
- C) $1 + x + \frac{x^2}{2}$
- $\bigcirc 1 + x + x^2$
- 5. Let *f* be the function with f(0) = 0 and derivative $f'(x) = \frac{1}{1+x^7}$. Which of the following is the Maclaurin series for *f*?
- (A) $x \frac{x^8}{8} + \frac{x^{15}}{15} \frac{x^{22}}{22} + \cdots$ (B) $x + \frac{x^8}{8} + \frac{x^{15}}{15} + \frac{x^{22}}{22} + \cdots$ (C) $-7x^6 + 14x^{13} - 21x^{20} + \cdots$ (D) $7x^6 + 14x^{13} + 21x^{20} + \cdots$

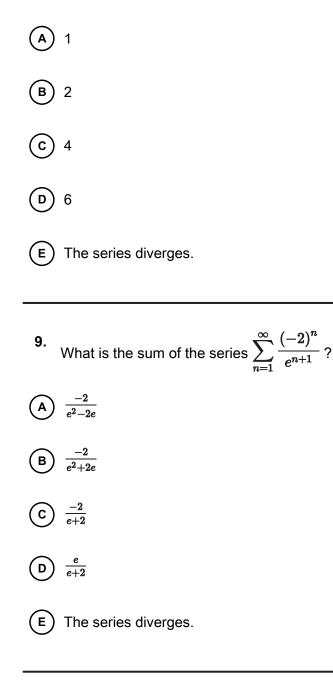




7. The infinite series ∑_{k=1}[∞] a_k has *n*th partial sum S_n = n/(3n+1) for, n ≥ 1. What is the sum of the series ∑_{k=1}[∞] a_k ?
A 1/3
B 1/2
C 1
D 3/2
E The series diverges

8. What is the value of
$$\sum_{n=1}^{\infty} \frac{2^{n+1}}{3^n}$$
?





10. What is the value of
$$\sum_{n=1}^{\infty} \frac{(-3)^{n+1}}{5^n}$$
 ?

A	$-\frac{15}{8}$
В	$-\frac{9}{8}$
c	$-\frac{3}{8}$
D	<u>9</u> 8
E	$\frac{15}{8}$

- **11.** Let *f* be a function with second derivative $f'(x) = \sqrt{1+3x}$. The coefficient of x^3 in the Taylor series for f about x = 0 is
- $\frac{1}{12}$ (A)
- $\frac{1}{6}$ в)
- $\frac{1}{4}$ С

D)

- $\frac{1}{2}$ $\frac{3}{2}$ E)
- What are all values of *x* for which the series $\sum_{n=1}^{\infty} \left(\frac{2}{x^2+1}\right)^n$ converges? 12.



(A) -1 < x < 1(B) x > 1 only (C) $x \ge 1$ only (D) x < -1 and x > 1 only

(E) $x \leq -1$ and $x \geq 1$

13. What is the radius of convergence of the series $\sum_{n=0}^{\infty} \frac{(x-4)^{2n}}{3^n}$?

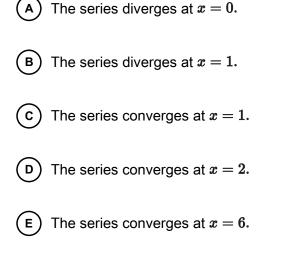


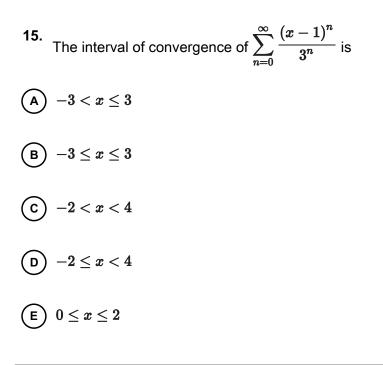
$$\bigcirc \sqrt{3}$$

$$\begin{array}{c} D & \frac{\sqrt{3}}{2} \\ \hline \end{array} \\ \hline \end{array} \\ \hline \end{array} \\ \begin{array}{c} D \\ \end{array} \\ 0 \end{array}$$

14. The power series $\sum_{n=0}^{\infty} a_n (x-3)^n$ converges at x=5. Which of the following must be true?





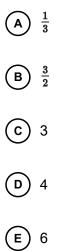


16. Which of the following is the interval of convergence for the series $\sum_{n=0}^{\infty} \frac{(x+2)^n}{2^n}$?



- (A) -4 < x < 0(B) $-4 \le x < 0$ (C) -2 < x < 0(D) $-2 \le x < 0$
- 17. What is the radius of convergence of the Maclaurin series for ^{2x}/_{1+x²}?
 (A) 1/2
 (B) 1
 (C) 2
 (D) infinite
- **18.** What is the radius of convergence for the power series $\sum_{n=0}^{\infty} \frac{(x-4)^n}{2 \cdot 3^{n+1}}$?





19. If $f(x) = x \sin(2x)$, which of the following is the Taylor series for *f* aboutx=0?

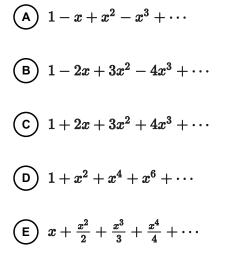
(A) $x - \frac{x^3}{2!} + \frac{x^5}{4!} - \frac{x^7}{6!} + \cdots$ (B) $x - \frac{4x^3}{2!} + \frac{16x^5}{4!} - \frac{64x^7}{6!} + \cdots$ (C) $2x - \frac{8x^3}{3!} + \frac{32x^5}{5!} - \frac{128x^7}{7!} + \cdots$ (D) $2x^2 - \frac{2x^4}{3!} + \frac{2x^6}{5!} - \frac{2x^8}{7!} + \cdots$ (E) $2x^2 - \frac{8x^4}{3!} + \frac{32x^6}{5!} - \frac{128x^8}{7!} + \cdots$

20. A function *f* has Maclaurin series given by $\frac{x^4}{2!} + \frac{x^5}{3!} + \frac{x^6}{4!} + \cdots + \frac{x^{n+3}}{(n+1)!} + \cdots$ Which of the following is an expression for f(x)?



(A) $-3x \sin x + 3x^2$ (B) $-\cos(x^2) + 1$ (C) $-x^2 \cos x + x^2$ (D) $x^2e^x - x^3 - x^2$ (E) $e^{x^2} - x^2 - 1$

21. Which of the following is the Maclaurin series for $\frac{1}{(1-x)^2}$?



22. What is the coefficient of x^6 in the Taylor series for $\frac{e^{3x^2}}{2}$ about x = 0?





23. A series expansion of $\frac{\sin t}{t}$ is (A) $1 - \frac{t^2}{3!} + \frac{t^4}{5!} - \frac{t^6}{7!} + \cdots$ (B) $\frac{1}{t} - \frac{t}{2!} + \frac{t^3}{4!} - \frac{t^5}{6!} + \cdots$ (C) $1 + \frac{t^2}{3!} + \frac{t^4}{5!} + \frac{t^6}{7!} + \cdots$ (D) $\frac{1}{t} + \frac{t}{2!} + \frac{t^3}{4!} + \frac{t^5}{6!} + \cdots$ (E) $t - \frac{t^3}{3!} + \frac{t^5}{5!} - \frac{t^7}{7!} + \cdots$

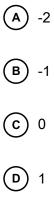
24. Which of the following is a power series expansion of $\frac{e^x + e^{-x}}{2}$?



(A)
$$1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \frac{x^6}{6!} + \dots + \frac{x^{2n}}{(2n)!} + \dots$$

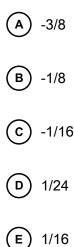
(B) $1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \dots + (-1)^n \frac{x^{2n}}{(2n)!} + \dots$
(C) $x + \frac{x^3}{3!} + \frac{x^5}{5!} + \frac{x^7}{7!} + \dots + \frac{x^{2n+1}}{(2n+1)!} + \dots$
(D) $x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \dots + (-1)^n \frac{x^{2n+1}}{(2n+1)!} + \dots$

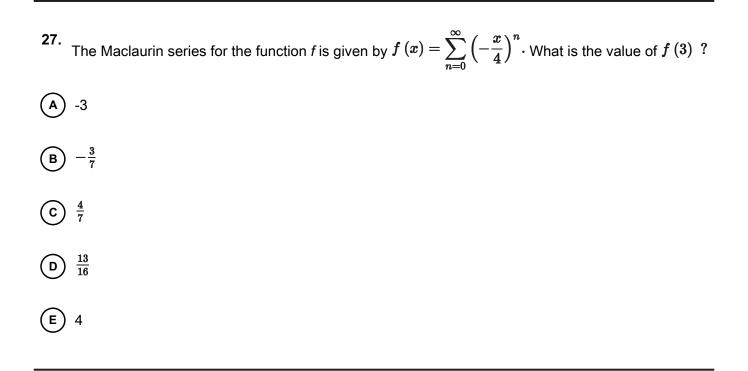
25. What is the coefficient of x^2 in the Taylor series for $\sin^2 x$ about x = 0?



- **E** 2
- **26.** Let *f* be the function given by $f(x) = \frac{1}{(2+x)}$. What is the coefficient of x^3 in the Taylor series for f about x = 0?







28. Which of the following are the first four nonzero terms of the Maclaurin series for the function g defined by $g(x) = (1+x)e^{-x}$?



(A)
$$1 + 2x + \frac{3}{2}x^2 + \frac{2}{3}x^3 + \cdots$$

(B) $1 + 2x + \frac{3}{2}x^2 + \frac{5}{6}x^3 + \cdots$
(C) $1 - \frac{1}{2}x^2 + \frac{1}{6}x^3 - \frac{1}{12}x^4 + \cdots$
(D) $1 - \frac{1}{2}x^2 + \frac{1}{3}x^3 - \frac{1}{8}x^4 + \cdots$