RAVI MATHS TUITION CENTER, CHENNAI-82. WHATSAPP - 8056206308

Continuity And Differentiability

12th Standard

Maths

80 x 1 = 80

1) Given functions f(x) = $\frac{x^2-4}{x-2}$ and g(x) = x + 2, x < = R. Then which of the following is

(a) f is continuous at x = 2, g is continuous at x = 2

(b) f is continuous at x = 2, g is not continuous at x = 2

(c) f is not continuous at x = 2, g is continuous at x = 2

(d) f is not continuous at x = 2, g is not continuous at x = 2

2) $\lim_{x\to 0} \frac{\sqrt{\frac{1}{2}(1-cosx)}}{x}$ is equal to

(a) 1 (b) -1 (c) 0 (d) none of this

3) If $f(x) = \frac{sin(e^{x-2}-1)}{log(x-1)}$, x ≠ 2 and f(x) = k for x = 2, then value of k for which f is continuous is

(a) -2 (b) -1 (c) 0 (d) 1

4) A function f is said to be continuous for x ∈ R, if

(a) it is continuous at x = 0 (b) differentiable at x = 0 (c) continuous at two points

(d) differentiable for x ∈ R

5) A function $f(x) = \begin{cases} \frac{sinx}{x} + cosx, x \neq 0 \\ 2k \quad\quad\quad , x = 0 \end{cases}$ is continuous at x = 0 for

(a) k = 1 (b) k = 2 (c) K = $\frac{1}{2}$ (d) k = $\frac{3}{2}$

6) Write the number of points where f(x) = |x + 2| + |x – 3| is not differentiable

(a) 2 (b) 3 (c) 0 (d) 1

7) Derivative of cot x° with respect to x is

(a) cosec x° (b) cosec x° cot x° (c) -1° cosec2 x° (d) -1° cosec x° cot x°

8) If y = $\sin^{-1}\left(\frac{3x}{2} - \frac{x^3}{2}\right)$, then $\frac{dy}{dx}$ is

(a) $\frac{3}{\sqrt{4-x^2}}$ (b) $\frac{-3}{\sqrt{4-x^2}}$ (c) $\frac{1}{\sqrt{4-x^2}}$ (d) $\frac{-1}{\sqrt{4-x^2}}$

9) If f(x) = $\log^{x^2}$ (log x), then f(e) is

(a) 0 (b) 1 (c) $\frac{1}{e}$ (d) $\frac{1}{2e}$

10) If f(x) = e^x and g(x) = $\log_e$ x, then (gof)' (x) is

(a) 0 (b) 1 (c) e (d) 1 + e

11) If y = $\tan^{-1}\left(\frac{1-x^2}{1+x^2}\right)$, then $\frac{dy}{dx}$ is equal to

(a) $\frac{1}{1+x^4}$ (b) $\frac{-2x}{1+x^4}$ (c) $\frac{-1}{1+x^4}$ (d) $\frac{x^2}{1+x^4}$

12) If y = $x^{x^{-\infty}}$, then x(1 -y log x)$\frac{dy}{dx}$ is equal to

(a) x^2 (b) y^2 (c) xy^2 (d) x^2y

13) The derivative of sin x with respect to log x is

(a) cos x (b) x cos x (c) $\frac{cosx\ x}{log\ x}$ (d) $\frac{1}{x}cos\ x$

14) If $y = Ae^{5x}$,+ Be^{-5x} x then $\frac{d^2y}{dx^2}$ is equal to

(a) 25y (b) 5y (c) -25y (d) 10y

15) Which of the following functions are not continuous.

(a) [x] (b) |x| (c) e^x (d) $\frac{1}{x}$, $x \neq 0$

16) The Function $f(x) = \frac{4-x^2}{4x-x^3}$

(a) Discontinuous exactly at two points (b) Discontinuous at every points

(c) Discontinuous at only one point (d) Discontinuous exactly at three points

17) Examine the continuity of the function $f(x) = \frac{x^2-4}{x-2}$

(a) Discontinuous at x = -2 (b) Discontinuous at x = 2 (c) Continuous everywhere

(d) Discontinuous at x = 4

18) Let $\begin{cases} 4x & > 2 \\ ax & 0 \leq x \leq 2 \\ b & x < 0 \end{cases}$ For what values of a and b, f is a continuous function.

(a) a = 2, b = 0 (b) a = 1, b = 0 (c) a = 0, b = 2 (d) a = 0, b = 0

19) Discuss the continuity of function f(x) = |x - 1| + |x + 1|

(a) discontinuous at x = 1 (b) discontinuous at x = ±1 (c) continuous everywhere

(d) discontinuous at x = -1

20) Examine the continuity of function f(x) = (x - 1) (x - 2)

(a) Discontinuous at x = 1, 2 (b) Discontinuous at x = 1 (c) Continuous everywhere.

(d) Discontinuous at x = 2

21) What is the point of discontinuity for signum function?

(a) x = 1 (b) x = -1 (c) x = 0 (d) function is continuous on R

22) Function f(x) = log x + $\sqrt{1-x^2}$ is continuous at

(a) (0, 1) (b) (-1, 1) (c) (0, ∞) (d) (0, 1)

23) The function f(x) = $\begin{cases} \frac{e^{1/x}-1}{e^{1/x}+1}, & x \neq 0 \\ 0 & x = 0 \end{cases}$

(a) is continuous at x = 0 (b) Continuous everywhere

(c) Not continuous at x = 0 but can be made continuous (d) Not continuous at x = 0

24) A real function f is said to be continuous if it is continuous at every point in ..... .

(a) [-∞,∞] (b) The range of f (c) The domain of f (d) Any interval of real numbers

25) The function $f(x) = \begin{cases} 1, & \text{if } x \neq 0 \\ 2, & \text{if } x = 0 \end{cases}$ is not continuous at

(a) x = 0 (b) x = 1 (c) x = -1 (d) None of these

26) The point of discontinuity of the function

$f(x) = \begin{cases} 2x+3, & \text{if } x \leq 2 \\ 2x-3, & \text{if } x > 2 \end{cases}$ is

(a) x = 0 (b) x = 1 (c) x = 2 (d) None of these

27) If $f(x) = \begin{cases} \lambda\left(x^2-2x\right), & \text{if } x \leq 0 \\ 4x+1, & \text{if } x > 0 \end{cases}$ then which one of the following is correct.

(a) f(x) is continuous at x = 0 for any value of λ (b) f(x) is discontinuous at x = 0 for any value of λ

(c) f(x) is discontinuous at x = 1for any value of (d) None of the above

28) The function $f(x) = \frac{4-x^2}{4x-x^3}$ is

(a) discontinuous at only one point (b) discontinuous at exactly two points

(c) discontinuous at exactly three points (d) None of the above

29) The function f(x) = cot x is discontinuous on the set

(a) $\{x = n\frac{1}{4} : n \in Z\}$ (b) $\{x = 2n\pi : n \in Z\}$ (c) $\{x = (2n+1)\frac{\pi}{2}; n \in Z\}$ (d) $\{x = \frac{n\pi}{2}; n \in Z\}$

30) The function defined by g(x) = x - [x] is discontinuous at

(a) all rational points (b) all irrational points (c) all integral points (d) None of the above

31) The function $f(x) = \begin{cases} \frac{k\cos x}{\pi - 2x}, & \text{if } x \neq \frac{\pi}{2} \text{ is} \\ 3, & \text{if } x = \frac{\pi}{2} \end{cases}$ continuous at $x = \frac{\pi}{2}$

(a) -6 (b) 6 (c) 5 (d) -5

32) The number of points at which the function $f(x) = \frac{1}{x-[x]}$ [·] denotes the greatest integer function is not continuous is

(a) 1 (b) 2 (c) 3 (d) None of these

33) If $f(x) = \begin{cases} \frac{\sqrt{1+kx}-\sqrt{1-kx}}{x}, & \text{for } -1 \leq x < 0 \\ 2x^2 + 3x - 2, & \text{for } 0 \leq x \leq 1 \end{cases}$ is continuous at x = 0, then k is equal to

(a) -4 (b) -3 (c) -2 (d) -1

34) If $f(x) = 2x$ and $g(x) = \frac{x^2}{2} + 1$ then which of the following can be a discontinuous function?

(a) f(x) + g (x) (b) f(x) - g(x) (c) f(x). g (x) (d) $\frac{g(x)}{f(x)}$

35) The set of points, where the function f given by $f(x) = |2x - 1| \sin x$ is differentiable, is

(a) R (b) $R - \{\frac{1}{2}\}$ (c) $(0, \infty)$ (d) None ofthese

36) If $f(x) = |\sin x|$ then

(a) f is everywhere differentiable

(b) f is everywhere continuous but not differentiable at $x = n\pi, n \in Z$

(c) f is everywhere continuous but not differentiable at $x = (2n+1)\frac{\pi}{2}, n \in Z$ (d) None of he above

37) The differential coefficient of sin ($\cos(x^2)$ with respect to x is.

(a) $-2x\sin x^2\cos(\sim os\ x^2)$ (b) $2x\sin(x^2)\cos(x^2)$ (c) $2x\sin(x^2)\cos(x^2)\cos x$ (d) None of the above

38) If $y = \sqrt{3x+2} + \frac{1}{\sqrt{2x^2+4}}$,then $\frac{dy}{dx}$ is equal to

(a) $\frac{3}{2\sqrt{3x+2}} - \frac{2x}{(2x^2+4)^{3/2}}$ (b) $\frac{3}{2\sqrt{3x+2}} + \frac{2x}{(2x^2+4)^{3/2}}$ (c) $\frac{3}{2\sqrt{3x+2}} + \frac{2}{(2x^2+4)^{3/2}}$ (d) None of the above

39) Let $f(x) = \begin{cases} (x-1)\sin\frac{1}{(x-1)} & \text{,if } x \neq 1 \\ 0 & \text{, if } x = 1 \end{cases}$ Then, which of the following is true?

(a) tis differentiable at x = 1 but not at x = 0 (b) t is neither differentiable at x = 0 nor at x = 1

(c) f is differentiable at x = 0 and at x = 1 (d) f is differentiable at x = 0 but not at x = 1

40) If y + siny = cosx, then $\frac{dy}{dx}$ is equal to

(a) $-\frac{\sin x}{1+\cos y}, y = (2n+1)\pi$ (b) $\frac{\sin x}{1+\cos y}, y \neq (2n+1)\pi$ (c) $\frac{\sin x}{1+\cos y}, y \neq (2n+1)\pi$ (d) None of the above

41) If 2x + 3y = sinx, then $\frac{dy}{dx}$ is equal to

(a) $\frac{\cos x+2}{3}$ (b) $\frac{\cos x-2}{3}$ (c) cosx + 2 (d) None of the above

42) If $y = \sqrt{\sin x + y}$, then $\frac{dy}{dx}$ is equal to

(a) $\frac{\cos x}{2y-1}$ (b) $\frac{\cos x}{1-2y}$ (c) $\frac{\sin x}{1-2y}$ (d) $\frac{\sin \psi}{2y-1}$

43) If cos Y = xcos(a + y) with $\cos a \neq 1$, then $\frac{dy}{dx}$ is equal to

(a) $\frac{\sin^2(a+y)}{\sin \phi}$ (b) $\frac{\cos^2(a+y)}{\sin a}$ (c) $\sin^2(a+y)\sin a$ (d) None of these

44) If $y = \tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right), -\frac{1}{\sqrt{3}} < x < \frac{1}{\sqrt{3}}$,then $\frac{dy}{dx}$ is

(a) $\frac{3}{1+x^2}$ (b) $\frac{1}{1+x^2}$ (c) $\frac{-3}{1+x^2}$ (d) $\frac{3}{1-x^2}$

45) If $y = \sin^{-1} x + \sin^{-1} \sqrt{1-x^2}, -1 \leq x < 1,$ then $\frac{dy}{dx}$ is equal to

(a) 0 (b) 1 (c) 2 (d) 3

46) If y= log x^x, then the value of $\frac{dy}{dx}$ is

(a) $x^x(1+\log x)$ (b) log (ex) (c) $\log \frac{e}{x}$ (d) $\log\left(\frac{x}{e}\right)$

47) If $y = \log_a x + \log_x a + \log_x x + \log_a a,$ then $\frac{dy}{dx}$ is equal to

(a) $\frac{1}{x} + x \log a$ (b) $\frac{\log a}{x} + \frac{x}{\log a}$ (c) $\frac{1}{x \log a} + x \log a$ (d) None of these

48) If $y^x = e^{y-x},$ then $\frac{dy}{dx}$ is equal to

(a) $\frac{1+\log y}{y \log y}$ (b) $\frac{(1+\log y)^2}{y \log y}$ (c) $\frac{1+\log y}{(\log y)^2}$ (d) $\frac{(1+\log y)^2}{\log y}$

49) If $x = e^{x/y},$ then $\frac{dy}{dx}$ is equal to

(a) $\frac{x-y}{x \log x}$ (b) $\frac{y-x}{\log x}$ (c) $\frac{y-x}{x \log x}$ (d) $\frac{x-y}{\log x}$

50) If $x^y = y^x,$ then $x(x - y \log x)\frac{dy}{dx}$ is equal to

(a) y(y-xlogy) (b) y(y + xlogy) (c) x(x + ylogx) (d) x(y -xlogy)

51) The derivative of $\cos^{-1}\left(2x^2 - 1\right)$ w.r.t. $\cos^{-1} x$

(a) 2 (b) $\frac{-1}{2\sqrt{1-x^2}}$ (c) $\frac{2}{x}$ (d) 1- x^2

52) The derivative ofsin2 x with respect to $e^{\cos x}$ is

(a) $\frac{2\cos x}{e^{\cos x}}$ (b) $-\frac{2\cos x}{e^{\cos x}}$ (c) $\frac{2}{e^{\cos x}}$ (d) None of these

53) The derivative of b tans with respect to asec θ is

(a) $\frac{b}{a}\text{cosec}\,\theta$ (b) $\frac{a}{b}\text{cosec}\,\theta$ (c) $\frac{b}{a}\cot\theta$ (d) $\frac{a}{b}\cot\theta$

54) If $y = x^{x^{x^x}}$ then $\frac{dy}{dx}$ is equal to

(a) yx^{y-1} (b) $\frac{y^2}{x(1-y\log x)}$ (c) $\frac{y}{x(1+y\log x)}$ (d) None of these

55) If $y = (\cos x)^{(\cos x)^{(\cos x)\ldots\infty}}$,then $\frac{dy}{dx}$ is equal to

(a) $\frac{y\tan x}{y\log\cos x - 1}$ (b) $\frac{y^2\tan x}{y\log\cos x - 1}$ (c) $\frac{y\tan x}{1+y\log\cos x}$ (d) None ofthese

56) If $f(x) = \begin{cases} mx+1, & \text{if } x \leq \frac{\pi}{2} \\ \sin x + n, & \text{if } x > \frac{\pi}{2} \end{cases}$ is continuous at $x = \frac{\pi}{2}$

(a) m =1,1 =0 (b) $m = \frac{n\pi}{2} + 1$ (c) $n = \frac{m\pi}{2}$ (d) $m = n = \frac{\pi}{2}$

57) If $f(x) = |\cos x|$,then

(a) f is everywhere differentiable

(b) f is everywhere coqtinuous but not differentiable at $x = n\pi, n \in Z$

(c) is everywhere continuous but not differentiable at $x = (2n+1)\frac{\pi}{2}, n \in Z$ (d) None ofthe above

58) If $y = \log\left(\frac{1-x^2}{1+x^2}\right)$,then $\frac{dy}{dx}$ is equal to

(a) $\frac{4x^3}{1-x^4}$ (b) $\frac{-4x}{1-x^4}$ (c) $\frac{1}{4-x^4}$ (d) $\frac{-4x^3}{1-x^4}$

59) If $y = \log_7(\log x)$, then $\frac{ay}{dx}$ is equal to

(a) $\frac{1}{x \log x \log 7}$ (b) $\frac{-1}{x \log x \log 7}$ (c) $\frac{1}{x \log x}$ (d) None of these

60) If $y = a^{t+\frac{1}{t}}$ and $x = \left(t + \frac{1}{t}\right)^a$, then $\frac{dy}{dx}$ is equal to

(a) $\frac{a^{\left(1+\frac{1}{t}\right)} \log a}{\left(t+\frac{1}{t}\right)^{a-1}}$ (b) $\frac{a^{\left(1+\frac{1}{t}\right)}}{\left(t+\frac{1}{b}\right)^{a-1}}$ (c) $\frac{a^{\left(1+\frac{1}{t}\right)} \log a}{a\left(t+\frac{1}{t}\right)^{a-1}}$ (d) None of these

61) If $y = x \cos x$, then $\frac{d^2y}{dx^2}$ is

(a) $-x \cos x - 2 \sin x$ (b) xcosx + 2sinx (c) xsinx + cosx (d) None of these

62) If $y = \left(x + \sqrt{1+x^2}\right)^n$ is

(a) -xcosx -2sinx (b) xcosx + 2sinx (c) xsinx + cosx (d) None of these

63) If $y = \left(x + \sqrt{1+x^2}\right)^n$, then $\left(1+x^2\right)\frac{d^2y}{dx^2} + x\frac{dy}{dx}$ is equal to

(a) n^2y (b) $-n^Zy$ (c) -y (d) $2x^2y$

64) If $x = \sin t$ and $y = \sin pt$, then $\left(1-x^2\right)\frac{d^2y}{dx^2} - x\frac{dy}{dx}$ is equal to

(a) -y (b) y (c) py (d) $-p^2y$

65) The Rolle's theorem is applicable in the interval $-1 \leq x \leq 1$ for the function

(a) f(x) = x (b) $f(x) = x^2$ (c) $f(x)=2x^3+3$ (d) (x)=lxl

66) The value of c in Rolle's theorem for the function $f(x) = x^2 + 2x - 8, x \in [-4, 2]$ is

(a) 1 (b) -1 (c) 2 (d) -2

67) The value of c in Rolle's theorem for the function $f(x) = x^3 - 3x$ in the interval $[0, \sqrt{3}]$

(a) 1 (b) -1 (c) $\frac{3}{2}$ (d) $\frac{1}{3}$

68) For the function $f(x) = x^3 - 5x^2 - 3x, x \in [1, 3]$ the value of C for mean value theorem is

(a) $\frac{7}{4}$ (b) $\frac{7}{3}$ (c) $\frac{3}{7}$ (d) None of these

69) For the function $f(x) = x + \frac{1}{x}, x \in [1, 3]$ the value of C for mean value theorem is

(a) 1 (b) $\sqrt{3}$ (c) 2 (d) None of these

70) If $y = \cos^{-1} x$ then the value of $\frac{d^2y}{dx^2}$ in terms of y alone is

(a) $-\cot y \operatorname{cosec}^2 y$ (b) cosec y $\cot^2$ y (c) -cot y cosec y (d) None of these

71) If $y = 3\cos(\log x) + 4\sin(\log x)$,then

(a) $xy_2 + y_1 + y = 0$ (b) $xy_2 + y_1 - y = 0$ (c) $x^2y_2 + xy_1 + y = 0$ (d) None of these

72) If $y = \left(\tan^{-1} x\right)^2$,then the value of $\left(x^2+1\right)^2 y_2 + 2x\left(x^2+1\right)y_1$ is

(a) 2 (b) 3 (c) 4 (d) None of these

73) A function 'f is said to be continuous at x = a, if

(a) $\lim_{x \to a} f(x)$ exists (b) $\lim_{x \to a} f(x)$ does not exist (c) f(a) exists (d) none of these

74) State which of the following is continuous as well as differentiable for x ∈ R

(a) |x| (b) [x] (c) polynomial function (d) sgn (x)

75) Derivative of $\frac{x}{x-1}$ with respect to x, is

(a) 2 (b) $\frac{1}{(x-1)^2}$ (c) $\frac{2x-1}{(x-1)^2}$ (d) $\frac{-1}{(x-1)^2}$

76) State the function which is continuous for all x ∈ R,

(a) sin x (b) $\frac{x^2-25}{x-5}$ (c) [x] (d) sgn (x)

77) The function 'f 'defined by $f(x) = \begin{cases} \frac{x^3-8}{x-2}, & x \neq 2 \\ 12, & x = 2 \end{cases}$ is

(a) not continuous at x = 2 (b) continuous at x = 2 (c) not continuous at x = 3

(d) not continuous at x = - 2

78) If $x = at^2, y = 2at,$ then $\frac{d^2y}{dx^2}$ is

(a) $\frac{1}{t}$ (b) $-\frac{1}{t^2}$ (c) at^2 (d) $\frac{-1}{2at^3}$

79) Derivative of $\frac{x}{2}\sqrt{a^2-x^2} + \frac{a^2}{2}\sin^{-1}\frac{x}{a}$, With respect to x, is

(a) $\sin^{-1}\frac{x}{a}$ (b) $\frac{x}{2}\sqrt{a^2-x^2}$ (c) $\sqrt{a^2-x^2}$ (d) $\frac{1}{\sqrt{a^2-x^2}}$

80) Discuss the applicability of LMV Theorem for the function f(x) = |x|, in [1.1]

(a) applicable, c = 0 (b) applicable, c = -1 (c) applicable, c = 1 (d) not applicable

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