REX HOME TUITION

IIT JEE / MEDICAL / SCHOOL

9523921746

Continuity and Differentiability

1. Check the Continuity and Differentiability of function $y = |x| + |x+1|$

2. Check the Continuity and Differentiability of function $= [x] + |x|$, $-2 \le x \le 2$

3. Check the Continuity and Differentiability of function

$$f(x) = \begin{cases} -2x+1, & x < 0 \\ x+4, & x \ge 0 \end{cases}, \quad -1 \le x \le 2$$

4. Draw the graph of the function $y = |x| + |x+1| + |x-1|$

5. Draw the graph of the function $f(x) = \frac{x^2-4}{x-2}$

6. Find the values of a and b so that $f(x) = \begin{cases} ax+b & if\ x < 0 \\ 2sinx + 3cosx & if\ x \ge 0 \end{cases}$

7. Find the number c that makes $f(x) = \begin{cases} \frac{x-c}{c+1} & if\ x \le 0 \\ x^2 + c & if\ x > 0 \end{cases}$

8. Choose the correct option.

a. Let $f(x) = \begin{cases} 0 & : x > 0 \\ x^2 & : x \le 0 \end{cases}$, $then\ for\ all\ x$

(a) f' is differentiable
(b) f' is continuous
(c) f is differentiable
(d) f is continuous

b. If $x + |y| = 2y$, then y as a function of x is

(a) defined for all real x

(b) continuous at x = 0

(c) differentiable for all x

(d) such that $\frac{dy}{dx} = \frac{1}{3}$, for x < 0

9. The function $f(x) = \begin{cases} x + a\sqrt{2}Sinx & , 0 \le x < \frac{\pi}{4} \\ 2xCotx + 6 & , \frac{\pi}{4} \le x \le \frac{\pi}{2} \\ aCos2x - bSinx & , \frac{\pi}{2} < x \le \pi \end{cases}$ is continuous for $[0, \pi]$ then find the value of a , b .

10. Let $f(x+y) = f(x)f(y)$ for all x and y . Suppose $f(5) = 2$, $f'(0) = 3. find\ f'(5)$.

11. Find the values of a , b so that the function $f(x) = \begin{cases} (x^2 + 3x + a)\ when\ x \le 1 \\ (bx+2)\ when\ x > 1 \end{cases}$ is differentiable at each $x \in R$.

12. Find the values of A , B , C so that function $f(x) = \begin{cases} A\tan^{-1}\left(\frac{1}{x-4}\right)\ If\ 0 \le x \le 4 \\ C\ If\ x = 4 \\ B\tan^{-1}\left(\frac{2}{x-4}\right)\ If\ 4 < x < 6 \\ \sin^{-1}(7-x) + A\frac{\pi}{4}\ If\ 6 \le x \le 8 \end{cases}$ is continuous in the interval $[0,8]$

13. Discuss the continuity of $f(x) = [\tan^{-1} x]$ $\{-tan1, 0, tan1\}$

14. Let $y = f(x)$ be defined parametrically as $= t^2 + t|t|$, $x = 2t - |t|$, $t \in R$. Then , at $x = 0$, Find $f(x)$ and discuss continuity.
Continuous in all R

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Differentiation

Differentiate the following function w.r.t x

1. $y = xe^x Cosx$
2. $y = SinxCosx$
3. $y = \sqrt{\sqrt{x}}$
4. $y = \sqrt{\tan\sqrt{x}}$
5. $y = Cos^2(3x+5)$
6. $y = \sqrt{Sinx} + Sin\sqrt{x}$
7. If $y = Sin(logx)\ find\ \frac{dy}{dx}$
8. $y = \frac{Cosx}{e^x}$
9. $y = \frac{Sinx}{xe^x}$
10. If $(x) = (x+1)(x+2)(x+3) \dots\dots\dots\dots (x+n)$, then find then value of $f'(0)$
11. If $x^y + y^x = a^b\ \ find\ \frac{dy}{dx}$
12. $y = x^{x^{x^{x \dots \alpha}}}$
13. If $\emptyset = ax^2 + by^2 + 2gx + 2fy + 2hxy + c$, $find\ \frac{\partial \emptyset}{\partial x}$ and $\frac{\partial \emptyset}{\partial y}$
14. If $= \frac{x^2y^2}{x+y}$, then Show that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = 3u$
15. $u = xSin(y-x)$, prove that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} = \frac{u}{x}$

16. If $f(x,y) = xCosy + yCosx$ (i) Find (i) f_{yy} (ii) Prove that $\frac{\delta^2 f}{\delta x \delta y} = \frac{\delta^2 f}{\delta y \delta x}$
17. If$x = aSec^3\theta \ and \ y = atan^3\theta$, $find \ \frac{dy}{dx} \ at \ \theta = \ ^{\pi}/_{4}$
18. $y = \sin^{-1} x + \cos^{-1} x$
19. $y = Sin2x + 2Sinx$
20. $y = Sinx^2 + Cos^2x$
21. $y = \ x^2 + 2^x$
22. $y = e^xSinx + \ \sin e^x$
23. $y = Logx + Logx^2$
24. $s = t^3 - 2t^2 - 5$, find $\frac{ds}{dt}$ at t = 3
25. $y = x^5 + 4x^4 + 3x^3 + 2x + 4$ find $\frac{d^3y}{dx^3} \ at \ x = 4$
26. If $e^y(x+1) = 1$, Show that $\frac{d^2y}{dx^2} = \left(\frac{dy}{dx}\right)^2$
27. If $y = \cos^{-1} x$, Find $\frac{d^2y}{dx^2}$ in terms of y alone
28. If $y = \tan(x+y)$, $find \ \frac{dy}{dx}$
29. If $y = 3Cos(logx) + 4Sin(logx)$, Show that $x^2y_2 + xy_1 + y = 0$
30. If $e^x + e^y = e^{x+y}$, then prove that $\frac{dy}{dx} = \ -e^{y-x}$
31. Verify $x + y = \ \tan^{-1} y$ is the solution of differential equation $y^2y' + y^2 + 1$
32. Verify $y = \sqrt{a^2 - x^2} \ \ x \in (-a,a))$, $\ x + y\frac{dy}{dx} = 0 \ (y \neq 0)$
33. Verify $\ xy = logy + C \ \ , \ y' = \frac{y^2}{1-xy} \ \ (xy \neq 1)$
34. Verify $y = xSinx \ \ \ \ , xy' = y + x\sqrt{x^2 - y^2} \ (x \neq 0 \ and \ x > y \ or \ x < -y)$te

Differentiate the following at x =1

35. $y = [|Sinx| + |Cosx|]$
36. $y = e^{-|x|}$
37. $y = x^2 - 3x + 2$
38. $y = min\{|x|, |x+1|, |x-1|\}$