MATHS

BOOKS - JMD MATHS (PUNJABI ENGLISH)

Continuity and differentiablity

Exercise

1. If the function f is defined by $f(x) = \begin{cases} 3 & x \neq 0 \\ a+1 & x = 0 \end{cases}$ and f is

continuous at x = 0, then value of a is :

A. 1

B. 2

C. 3

D. 4

Answer: B

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2. If the function f(x) = $\begin{bmatrix} \left(\sin 3\frac{x}{x}\right) & x \neq 0 \\ k & x = 0 \end{bmatrix}$ is continuous at x=0, then k=

A. 1

B. 2

C. 3

D. 4

Answer: D

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3. Find k, if f(x) = $\left[\left(x^2-9\right), x \neq 3\right], [k, x=3]]$ is continuous at x=3,

A. 6

B. 0

C. 2

D. 1

Answer: A

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4. The derivative of $e^{2\log x}$

A. $e^{2\log x}$

B. 2x

C. x

D. x^2

Answer: B

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5. $\frac{d}{dx}(7x+5)^3$

A. $\left[21(7x+5)^2\right]$

B. $\left[3(7x+5)^2\right]$

C. $\left[7(7x+5)^2\right]$

D. 21

Answer: A

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6. $\left[\frac{d}{dx}\left(\sin^{-1}x+\cos^{-1}x\right)\right]$

A. 1

B. $\frac{\pi}{2}$

C. 0

D. x

Answer: C

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7. $\frac{d}{dx}\left[\sqrt{3x+4}\right]$

A. $1/2\left[\sqrt{3x+4}\right]$

B. $1/\left[\sqrt{3x+4}\right]$

C. $3/2\left[\sqrt{3x+4}\right]$

D. $3/\left[\sqrt{3x+4}\right]$

Answer: C

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8. $\frac{d}{dx}\left(\frac{1}{3}x^{\square}\right)$

A. $\frac{1}{3}x^3$

B. $-\frac{2}{3}x^3$

C. $\frac{1}{6}x$

D. x^2

Answer: D

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9. Fill in the blanks : $\frac{d}{dx}|3x+4|$ = _____

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10. Fill in the blanks: `d/dx{sin^(-1)x^2} = _____.

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11. Fill in the blanks : $\frac{d}{dx}\left[\sqrt{4x+5}\right]$=_____

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12. Fill in the blanks : $\frac{d}{dx}\left[\cos^{-1}(\sin x)\right]$

=_____

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13. Fill in the blanks : $\frac{d}{dx}\left[\sin^{-1} \cdot \frac{2x}{x^2+1}\right]$

=_____

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14. State True/False : the derivative of $\left[e^{e^x}\right.$ is $\left[e^{e^x}\right.$

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15. State True/False : the derivative of `[e^{log(4x+3)} is 4

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16. State True/False : the derivative of $\left[\sin^{-1} x + \cos^{-1} x\right]$ is $\frac{\pi}{2}$

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17. If $[x = a\{\theta - \sin(\theta)]$ and $[y = a\{1 - \cos(\theta)]$ find $\left[d^2 \frac{y}{dx^2} at$(theta = pi/2)`

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18. Verify Lagrange's Mean value Theorem for the function $\left[f(x)=\sqrt{x^2-4}\right]$ in the interval [2,4]

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19. Differentiate y with respect to x, where

$$\left[y=\frac{\tan^{-1}\left\{\sqrt{1+\sin x}+\sqrt{1-\sin x}\right\}}{\sqrt{1+\sin x}-\sqrt{1-\sin x}}\right]$$

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20. find $\frac{dy}{dx}$, if [sin^-1 {5x + 12 (sqrt(1- x^2)} / 13]`

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21. Differentiate $\left[\tan^{-1}\left\{2\frac{x}{1-x^2}\right\}\right]$ W.r.t $\left[\sin^{-1}\left\{2\frac{x}{1+x^2}\right\}\right]$

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22. Differentiate $\left[(\log x)^x + x(\log x)\right]$ w.r.t X.

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23. IF f(x) = $\left[\frac{3+x}{1+x}\right]^{2+3x}$ find'(0).

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24. If $y = \left\{x + \sqrt{x^2 + a^2}\right)^n$, prove that $\frac{dy}{dx} = \frac{ny}{\sqrt{x^2 + a^2}}$.

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25. IF $\left[x = a\left\{\frac{1+t^2}{1-t^2}\right]\right.$ and $\left[y = 2\frac{t}{1-t^2}\right]$

find dy/dx.

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26. If x= 3 sin t - sin 3t, y = 3 cos t - cos 3t, find

$d^2\frac{y}{dx^2}$ at $t = \frac{\pi}{3}$

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27. Differentiate $\left[x^{\tan x} + \sqrt{x^2 + \frac{1}{x}}\right]$ w.r.t X.

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28. IF $y = x^x$, show that $\left[\left(d^2\frac{y}{dx^2}\right) - \frac{1}{y}\left(\frac{dy}{dx}\right)^2 - \frac{y}{x} = 0\right]$

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29. x= a sin 2t(1 + cos2t) and y = b cos 2t(1- cos 2t) , show that $\left[\left(\frac{dy}{dx}\right)_{t=\frac{\pi}{4}} = \frac{b}{a}\right]$.

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30. Verify Lagrange's mean value theorem for the following function : $\left[f(x) = x^2 + 2x + 3\right]$ for [4,6]

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31. f(x) = [(1-sin^3x)/(3cos^2x) ,if x< pi/2], [a, if (x= pi/2) if f(x) be a] , [{b(1- sinx) /(pi - 2x)^2 , if x> pi/2]]$cont \in uous functionatx =$ (pi/2)` find a and b.

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32. IF $\left[y\left\{\sqrt{x^2+1}-\log\left\{\frac{1}{x}+\sqrt{1+\frac{1}{x^2}}\right\}\right\}\right]$

find dy/dx

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33. IF $y=\left[\log\left(x+\sqrt{1+x^2}\right)\right]^2$,show that $\left(1+x^2\right)\frac{d^2y}{dx^2}+x\left(\frac{dy}{dx}\right)=0$

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34. Diff. $\left[x^{\sin x}+(\sin x)^{\cos x}\right]$ w.r.t. x.

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35. IF $\left[\log\left(x^2+y^2\right)=2\tan^{-1}\left(\frac{y}{x}\right)\right]$ then show that , dy/dx = (x+y) /(x- y)

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36. IF $\left[y=\frac{\sin^{-1}}{\sqrt{1-x^2}}\right]$ show that : $\left[\left(1-x^2\right)\left(d^2\frac{y}{dx^2}\right)-3x\left(\frac{dy}{dx}\right)-y=0\right]$

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37. If $y = e^{a \sin^{-1} x}$, $[-1 \leq x \leq 1]$then show that $\left(1 - x^2\right) \frac{d^2y}{dx^2} - x \frac{dy}{dx} - a^2 y = 0$.

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38. IF $\left[x^p y^q = (x + y)^{p+q}\right]$, prove that dy/dx = y/x.

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39. Differentiate

$$\tan^{-1}\left\{\frac{\sqrt{1+x^2}+\sqrt{1-x^2}}{\sqrt{1+x^2}-\sqrt{1-x^2}}\right\} \text{ w.r.t.x}$$

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40. If $\left[(\cos x)^y = (\cos y)^x\right]$ find dy/dx,

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41. Differentiate the following with respect to x: $\left[\frac{\sin^{-1}\left\{2^{x+1}3^{x}\right\}}{1+(36)^{x}}\right]$

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42. IF $\left[y=\left(\tan^{-1}x\right)^{2}, showt\hat{}[(x\hat{}2 \quad +1)\hat{}2\right.$

d^2y/dx^2+2x (x^2 + 1)dy/dx=2]`

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43. Differentiate $\left[\tan^{-1}\left\{\frac{\sqrt{1-x^2}}{x}\right\}\right]$ with respect to $\left[\cos^{-1}\left\{2x\sqrt{1-x^2}\right\}\right]$

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44. If x cos (a + y)=cos y then prove that $\left[\frac{dy}{dx}=\frac{\cos^2(a+y)}{\sin a}\right]$. Hence show that $\left[\sin a\left(d^2\frac{y}{dx^2}\right)+\sin 2(a+y)\frac{dy}{dx}=0\right]$.

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