MATHS

BOOKS - ML KHANNA

DIFFERENTIATION

Problem Set 1

1. If $y = \tan^{-1}\left\{\frac{\cos x + \sin x}{\cos x - \sin x}\right\}$, then $\frac{dy}{dx}$ =

A. 0

B. 1

C. -1

D. None

Answer: B

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2. If $y = \tan^{-1}\left\{\frac{a\cos x - b\sin x}{b\cos x + a\sin x}\right\}, \frac{dy}{dx} =$

A. $\frac{1}{1+x^2}$

B. $\frac{1}{\sqrt{1-x^2}}$

C. -1

D. None

Answer: C

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3. If $y = \tan^{-1}\frac{x}{1+\sqrt{(1-x^2)}} + \sin\left\{2\tan^{-1}\sqrt{\left(\frac{1-x}{1+x}\right)}\right\}$ then $dy/dx =$

A. $\frac{x}{\sqrt{(1-x^2)}}$

B. $\frac{1-2x}{\sqrt{(1-x^2)}}$

C. $\frac{1-2x}{2\sqrt{(1-x^2)}}$

D. $\frac{1}{(1-x^2)}$

Answer: C

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4. $\tan^{-1}\frac{\sqrt{(1+x)}-\sqrt{(1-x)}}{\sqrt{1+x}+\sqrt{(1-x)}}, \frac{dy}{dx} =$

A. $\frac{1}{\sqrt{(1-x2)}}$

B. $\frac{1}{2\sqrt{(1-x^2)}}$

C. $\frac{x}{\sqrt{(1-x^2)}}$

D. None

Answer: B

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5. If $e^x = \frac{\sqrt{1+t}-\sqrt{1-t}}{\sqrt{1+t}+\sqrt{1-t}}$ and $\tan\frac{y}{2} = \sqrt{\frac{1-t}{1+t}}$ then $\frac{dy}{dx}$ at $t = \frac{1}{2}$ is

A. $1/2$

B. $-1/2$

C. 0

D. None

Answer: B

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6. The derivation of $\tan^{-1}\left\{\frac{1+x}{1-x}\right\}$ is

A. $\frac{2}{1+x^2}$

B. $\frac{1}{1+x^2}$

C. $\frac{1+x^2}{1-x^2}$

D. None

Answer: B

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7. If $y = \sin^{-1}\frac{2x}{1+x^2} + \sec^{-1}\frac{1+x^2}{1-x^2}$, then $\frac{dy}{dx} =$

A. $\frac{4}{1+x^2}$

B. $\frac{2}{1+x^2}$

C. $\frac{3}{1+x^2}$

D. None

Answer: A

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8. If $y = \sin^{-1} 2x.\sqrt{(1-x^2)} + \sec^{-1}\frac{1}{\sqrt{(1-x^2)}}$, then dy/dx =

A. $-\frac{1}{\sqrt{1-x^2}}$

B. $\frac{2}{\sqrt{1-x^2}}$

C. $\frac{3}{\sqrt{(1-x^2)}}$

D. None

Answer: C

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9. If $Y = \tan^{-1}\frac{4x}{1+5x^2} + \tan^{-1}\frac{2+3x}{3-2x}$, then $\frac{dy}{dx} =$

A. $\frac{3}{1+9x^2}$

B. $\frac{2}{1+4x^2}$

C. $\frac{5}{1+25x^2}$

D. None

Answer: C

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10. The derivation of $\tan^{-1}\left[(2x)/\left(1-x^2\right)\right] w.r.t \sin^{-1}\left\{2x/\left(1+x^2\right)\right\}$ Is .....

A. $\frac{2}{1+x^2}$

B. $\frac{2}{\sqrt{1-x^2}}$

C. 1

D. None

Answer: C

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11. the derivation of $\cos^{-1}\frac{1-x^2}{1+x^2} w.r.t \cot^{-1}\frac{1-3x^2}{3x-x^3}$ is

A. $\frac{1}{2}$

B. $\frac{2}{3}$

C. 1

D. $\frac{3}{2}$

Answer: B

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12. if $Y = \cos^{-1}\sqrt{\frac{\sqrt{1+x^2}+1}{2\sqrt{1+x^2}}}$ then $\frac{dy}{dx}$=

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

B. $\frac{1}{1+x^2}$

C. $-\frac{1}{2(1+x^2)}$

D. None

Answer: A

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13. If $y = \sin^{-1}\left[\left(1-x^2\right)/\left(1+x^2\right)\right]$. Then $\frac{dy}{dx} =$

A. $-2/\left(1+x^2\right)$

B. $2/\left(1+x^2\right)$

C. $1/\left(2+x^2\right)$

D. $2/\left(2-x^2\right)$

Answer: A

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14. Differentation of $\sin^{-1}\frac{1-x}{1+x} w.r.t\sqrt{x}$ is

A. $\frac{1}{1+x}$

B. $\frac{-2}{1+x}$

C. $\frac{1}{1+x^2}$

D. None

Answer: B

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15. $\frac{d}{dx}\left\{\cos^{-1}\frac{x-x^{-1}}{x+x^{-1}}\right\}=$

A. $\frac{1}{1+x^2}$

B. $\frac{-2}{1+x^2}$

C. $\frac{2}{1-x^2}$

D. None

Answer: B

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16. The differential coefficient of log tan x is

A. $2\sec 2x$

B. $2\text{cosec}2x$

C. $2\sec^3 x$

D. $2\ \text{cosec}^3 x$

Answer: B

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17. If $y = \sec\tan^{-1} x$,

then $\frac{dy}{dx} =$

A. $x/(1+x^2)$

B. $x\sqrt{(1+x^2)}$

C. $1/\sqrt{(1+x^2)}$

D. $x/\sqrt{1+x^2}$

Answer: D

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18. If $Y = \sec^{-1}\left(\frac{\sqrt{x}+1}{\sqrt{x}-1}\right) + \sin^{-1}\frac{\sqrt{x}-1}{\sqrt{x}+1}$, then $\frac{dy}{dx} =$

A. 1

B. 2

C. 3

D. 0

Answer: D

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19. If $y = \sin^{-1} x + \sin^{-1}\sqrt{(1-x^2)}$, then $\frac{dy}{dx} =$

A. $\frac{1}{\sqrt{(1-x2)}}$

B. $\frac{x}{\sqrt{1-x^2}}$

C. 0

D. None

Answer: C

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20. if $Y = \cos^{-1} 2x + \cot^{-1} 5x + \sin^{-1} 2x + \tan^{-1} 5x$ then

A. $Y'(0) = 0$

B. $Y_2 = Y_4$

C. $Y_5 = Y_6$

D. $Y_1 = Y_3$

Answer: A::B::C::D

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21. If $y = f(x) = \left(\frac{\tan^m x}{\tan^n x}\right)^{m+n} \cdot \left(\frac{\tan^n x}{\tan^p x}\right)\left(\frac{\tan^p x}{\tan^m x}\right)$ then $\frac{dy}{dx}$=

A. 0

B. 1

C. $\tan^{m+n+p}x$

D. None

Answer: A

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22. If $y = \frac{1}{1 + x^{q-p} + x^{r-p}} + \frac{1}{1 + x^{r-q} + x^{p-q}} + \frac{1}{1 + x^{p-r} + x^{q-r}}$ then $\frac{dy}{dx} =$

A. 0

B. 1

C. $(p + q + r)x^{p+q+r}$

D. None

Answer: A

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23. if $f(x)\sin\left\{\frac{\pi}{3}[X]-x^2\right\}$ for $2<x<3$ and [X] denotes the greatest integer less than or equal to x then $f'\left[\sqrt{\pi/3}\right]$ is equal to

A. $-\sqrt{\frac{\pi}{3}}$

B. $\sqrt{\frac{\pi}{3}}$

C. $-\frac{\sqrt{\pi}}{2}$

D. $-\sqrt{\pi}$

Answer: A

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24. the derivative of the function $\cot^{-1}\left[(\cos 2x)^{1/2}\right]$ $\text{at}x=\frac{\pi}{6}$ is

A. $(2/3)^{1/2}$

B. $(1/3)^{1/2}$

C. $3^{1/2}$

D. $6^{1/2}$

Answer: A

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25. If $y = \sin^{-1}\sqrt{(1-x)} + \cos^{-1}\sqrt{x}$ then $dy/dx =$

A. $\frac{1}{\sqrt{[x(1-x)]}}$

B. $\frac{-1}{\sqrt{[x(1-x)]}}$

C. $\frac{1}{[x(1-x)]}$

D. None

Answer: B

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26. If $Y = \tan^{-1}\left[\left\{\sqrt{(1+x^2)} - 1\right\}/x\right]$ then

A. $Y'(0) = 1$

B. $y'(0) = \frac{1}{2}$

C. $y'(0) = 0$

D. None of these

Answer: B

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27. The derivation of $\sin^{-1}(x)\ w.r.t \cos^{-1}\sqrt{(1-x^2)}$ is

A. $1/(1-x^2)$

B. $\cos^{-1}$ x

C. 1

D. None

Answer: C

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28. If $y = \sin\left(2\sin^{-1}x\right).\ \dfrac{dy}{dx} =$

A. $\sqrt{\left(\dfrac{1-y^2}{1-x^2}\right)}$

B. $2\dfrac{(1-2x^2)}{\sqrt{(1-x^2)}}$

C. $\dfrac{\sqrt{(1-x^2)}}{1-y^2}\Bigg)$

D. None

Answer: B

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29. Derivatice of $\sec^{-1}\left\{1/\left(2x^2-1\right\}w.\ r.\ t\sqrt{(1+3x)}\right.$ at $x = -\dfrac{1}{3}$ is

A. 0

B. $1/2$

C. $1/3$

D. None

Answer: A

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30. the derivation of $\sec^{-1}\left(\frac{1}{2x^2-1}\right) w.r.t \sqrt{1-x^2}$ at $x = 1/2$ is

A. 2

B. 4

C. 1

D. -2

Answer: B

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31. If $f(x) = \tan^{-1}\sqrt{\frac{1+\sin x}{1-\sin x}}, 0 \le x \le \frac{\pi}{2} then f'\left(\frac{\pi}{6}\right)$ =?

A. $-\frac{1}{4}$

B. $-\frac{1}{2}$

C. $\frac{1}{4}$

D. $\frac{1}{2}$

Answer: D

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32. If $y = \tan^{-1}\left[\frac{\sqrt{1+x^2}+\sqrt{1-x^2}}{\sqrt{1+x^2}-\sqrt{1-x^2}}\right]$, then $\frac{dy}{dx}$ equals

A. $\frac{1}{\sqrt{1-x^4}}$

B. $-\frac{1}{\sqrt{1-x^4}}$

C. $\frac{x}{\sqrt{1-x^4}}$

D. $-\frac{x}{\sqrt{1-x^4}}$

Answer: D

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33. If $y = \sin^{-1}\dfrac{\sqrt{(1+x)}+\sqrt{(1-x)}}{2}$ then $\dfrac{dy}{dx} =$

A. $\dfrac{1}{\sqrt{(1-x^2)}}$

B. $-\dfrac{1}{\sqrt{1-x^2}}$

C. $-\dfrac{1}{2\left(\sqrt{1-x^2}\right)}$

D. None

Answer: C

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34. If $\dfrac{\cos^4\alpha}{x}+\dfrac{\sin^4\alpha}{y}=\dfrac{1}{x+y}$ then $\dfrac{dy}{dx} =$

A. xy

B. $\tan^2\alpha$

C. 0

D. $\left(x^2+y^2\right)\sec^2\alpha$

Answer: B

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35. if $\sqrt{\left(1-x^2\right)}+\sqrt{\left(1-y^2\right)}=\alpha(x-y)$, then $\frac{dy}{dx}=$

A. $\sqrt{\left(\frac{1-y^2}{1-x^2}\right)}$

B. $\sqrt{\left(\frac{1-x^2}{1-y^2}\right)}$

C. $\sqrt{\left(1-x^2\right)\left(1-y^2\right)}$

D. None

Answer: A

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36. If $\sin^{-1}\left[\sqrt{x-ax}-\sqrt{a-ax}\right]$, then $\frac{dy}{dx}=$

A. $\frac{1}{\sin\sqrt{a-ax}}$

B. $\sin\sqrt{x}\sin\sqrt{a}$

C. $\frac{1}{2\sqrt{x}\sqrt{1-x}}$

D. 0

Answer: C

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37. If $\sqrt{x+y}+\sqrt{y-x}=\lambda$ then $\frac{d^2y}{dx^2}$ equals

A. $\frac{-2}{\lambda^2}$

B. $\frac{2}{\lambda^2}$

C. $\frac{2}{\lambda}$

D. None

Answer: B

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38. If $y = \sin^n x \cos nx$ then $\frac{dy}{dx} =$

A. $n \sin^{n-1} x \cos(n+1)x$

B. $n \sin^{n-1} x \sin(n+1)x$

C. $n \sin^{n-1} x \cos(n-1)x$

D. $n \sin^{n-1} x \cos nx$

Answer: A

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39. if f(x) = cos x cos 2x cos 4x cos 8 x cos 16 x , then $f'(\pi/4)$ is

A. 1

B. $\sqrt{2}$

C. $1/\sqrt{2}$

D. None

Answer: B

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40. the derivation of $\tan^{-1}\left(\frac{\sqrt{1+x^2}-1}{x}\right)$ with respect to $\tan^{-1}\left(\frac{2x\sqrt{1-x^2}}{1-2x^2}\right)$ at x=0 ,is

A. $1/8$

B. $1/4$

C. $1/2$

D. 1

Answer: B

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41. If $y = \tan^{-1}\left(\frac{\log(e/x^2)}{\log(ex^2)}\right) + \tan^{-1}\left(\frac{3+2\log x}{1-6\log x}\right)$ then $\frac{d^2y}{dx^2}$ is

A. 2

B. 1

C. 0

D. -1

Answer: C

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42. If $f(x) = \cot^{-1}\left(\frac{x^x - x^{-x}}{2}\right)$ then $f'(1)$ equals

A. -1

B. 1

C. $\log 2$

D. $-\log 2$

Answer: A

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43.

$$y = \tan^{-1}\frac{1}{1+x+x^2} + \tan^{-1}\frac{1}{x^2+3x+3} + \tan^{-1}\frac{1}{x^2+5x+7} +$$

n terms then y'(0)=

A. $\frac{n^2}{n^2+1}$

B. $\frac{-n^2}{n^2+1}$

C. $\frac{-1}{n^2+1}$

D. $\frac{1}{n^2+1}$

Answer: B

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44. If $y = \sum_{n=1}^{x} \tan^{-1}\frac{1}{1+n+n^2}$, then $\frac{dy}{dx}$=

A. $\frac{1}{1+x^2}$

B. $\frac{1}{1+(1+x)^2}$

C. 0

D. None

Answer: B

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45. If $y=(1+x)^n$ then the value of $(y_0)+(y_1)_0+\frac{(y_2)_0}{2!}+\frac{(y_3)_0}{3!}+\ldots\frac{(y_n)_0}{n!}$ is

A. 2^n

B. 2^{n-1}

C. n

D. None

Answer: A

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46. If $f(x) = x^n$ then the value of $f(1) + \frac{f'(1)}{1!} + \frac{f''(1)}{2!} + \frac{f'''(1)}{3!} + \ldots + \frac{f^n(1)}{n!}$ is

A. n

B. $\frac{n(n+1)}{2}$

C. 2^n

D. 2^{2n-1}

Answer: C

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47. If $f(x) = e^x - e^{-x} - 2\sin x - \frac{2}{3}x^3$ then the least value of n for which $\frac{d^n}{dx^n}$ f(x) at x=0 is non - zero is

A. 2

B. 1

C. 7

D. either 1 or 2

Answer: C

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48. If $f(x) = \sqrt{x^2 - 4x + 4}$ on the interval [0.3] then $f'(2+) = \ldots\ldots And f'(2-) = \ldots\ldots$

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49. If $\frac{d}{dx}\left(\frac{1 + x^2 + x^4}{1 + x + x^2}\right) = ax + b$ then $a =$ and b=.....

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Problem Set 2

1. If $x = a(t + \sin t), y = a(1 - \cos t)$ then dy / dx =

A. $\tan\frac{t}{2}$

B. $\frac{\cot(t)}{2}$

C. $\frac{\sec(t)}{2}$

D. $\text{cosec}\frac{t}{2}$

Answer: A

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2. If $x = a[\cos t + \log\tan(t/2)], y = a\sin t, \frac{dy}{dx} =$

A. $\tan t$

B. $\cos t$

C. $\sec t$

D. cosec t

Answer: A

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3. If $x = 3\cos\theta - 2\cos^2\theta, y = 3\sin\theta - 2\sin^3\theta, then$(dy)/(dx)=`

A. $\sin\theta$

B. $\cos\theta$

C. $\tan\theta$

D. $\cot\theta$

Answer: D

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4. if $x = a\cos^3 t, y = b\sin^3 t,$ then $\frac{dy}{dx}$ =

A. $3(b/a)\tan^2 t\sec^2 t$

B. $-(a/b)\cot t$

C. $-(b/a)\tan t$

D. None

Answer: C

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5. If x = $a\cos^3\theta, y = a\sin^3\theta then\sqrt{1+\left(\frac{dy}{dx}\right)^2}$ =?

A. $\tan^2\theta$

B. $\sec^2\theta$

C. $\sec\theta$

D. $|\sec\theta|$

Answer: D

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6. If $x = 2\log\cot t$ and $y = \tan t + \cot t$, then $\frac{dy}{dx}\sin 2t + 1 =$

A. $\cos^2 t$

B. $\sin^2 t$

C. $\cos 2t$

D. $2\cos^2 t$

Answer: D

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7. If $t(1 + x^2) = x$ and $x^2 + t^2 = y$ then at $x = 2$ the value of $\frac{dy}{dx}$ is

A. $\frac{488}{125}$

B. $\frac{88}{125}$

C. $\frac{101}{125}$

D. None

Answer: A

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8. A point of the parabola $y^2 = 18x$ at which the ordinate increases at twice the rate of abscissa is :

A. $(2, 4)$

B. $(2, -4)$

C. $\left(-\frac{9}{8}, \frac{9}{2}\right)$

D. $\left(\frac{9}{8}, \frac{9}{2}\right)$

Answer: D

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9. A spherical iron ball 10 cm in radius is coated with a layer of ice of unirform thichness that melts at a rate of $50cm^3$/min. when the thickness

of ice is 5 cm, then the rate at which the thickness of ice decreases, is

A. $\frac{1}{54\pi} cm / \min$

B. $\frac{5}{6\pi} cm / \min$

C. $\frac{1}{36\pi} cm / \min$

D. $\frac{1}{18\pi} cm / \min$

Answer: D

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10. If $x = a \sin 2\theta(1 + \cos 2\theta), y = b \cos 2\theta(1 - \cos 2\theta)$ then $\frac{dy}{dx} =$

A. $\frac{b \tan \theta}{a}$

B. $\frac{a \tan \theta}{b}$

C. $\frac{b \cot \theta}{a}$

D. None

Answer: A

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11. if $x\sqrt{(1+y)}+y\sqrt{(1+x)}=0$, then

dy /dx =

A. $1/(1+x)^2$

B. $-1/(1+x)^2$

C. $1/(1+x)$

D. None of these

Answer: B

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12. If $\sin y = x\sin(a+y)$, then $\frac{dy}{dx} =$

A. $\frac{\sin^2(a+y)}{\sin a}$

B. $\sin(a+y)$

C. $\sin^2(a+y)$

D. $\dfrac{\sin(a+y)}{\sin a}$

Answer: A

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13. If $\sin y = x\cos(a+y)$, then $\dfrac{dy}{dx} =$

A. $\dfrac{\sin^2(a+y)}{\sin a}$

B. $\dfrac{\cos a}{\cos^2(a+y)}$

C. $\dfrac{\cos^2(a+y)}{\cos a}$

D. None

Answer: C

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14. if $\sin y = x \sin(\alpha + y)$ and $\frac{dy}{dx} = \frac{a}{x^2 + 2xb + 1}$ then

A. $a = b$

B. $a - b = 1$

C. $a + b = 1$

D. $a^2 + b^2 = 1$

Answer: D

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15. If $y = \sqrt{(\sin x + y)}, then dy/dx =$

A. $\sin x / (2y - 1)$

B. $\sin x / (1 - 2y)$

C. $\cos x / (1 - 2y)$

D. $\cos x / (2y - 1)$

Answer: D

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16. If $x^y = e^{x-y}$ then $\frac{dy}{dx}$=

A. $\frac{\log x}{(1+\log x)^2}$

B. $\frac{x-y}{(1+\log x)^2}$

C. $\frac{x+y}{(1+\log x)^2}$

D. $\frac{1}{1+\log x}$

Answer: A

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17. If $y = \log_y x, then \frac{dy}{dx}$=

A. $\frac{1}{x+\log y}$

B. $\frac{1}{\log x(1+y)}$

C. $\frac{1}{x(1+\log y)}$

D. $\frac{1}{y+\log x}$

Answer: C

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18. If $y = x^{e^x}$, then $\frac{dy}{dx}$=

A. $y(\log x + e^x)$

B. $y \log x\left(\frac{1}{2} + e^x\right)$

C. $ye^x(\log x + x)$

D. $ye^x\left(\log x + \frac{1}{X}\right)$

Answer: D

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19. If $y = \log|x|, then \frac{dy}{dx}$ =

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

B. $-\frac{1}{x}$

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

D. None

Answer: A

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20. If f(x) =| log x|, then `

A. $y'(1+) = \frac{1}{x}$

B. $y'(1-) = -\frac{1}{x}$

C. $y'(1) = 1$

D. $y'(0) = \infty$

Answer: A::B

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21. The differential coefficient of f (log x) where f (x) =log x ` is

A. $x / \log x$

B. $(\log x) / x$

C. $(x \log x)^{-1}$

D. None of these

Answer: C

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22. Given the parametic equations $x = f(t), y = g(t)$ then $\frac{d^2y}{dx^2}$ equals

A. $\frac{\frac{d^2y}{dt^2} \cdot \frac{dx}{dt} - \frac{dy}{dt} - \frac{dy}{dt}\frac{d^2x}{dt^2}}{(dx/dt)^2}$

B. $\frac{\frac{dx}{dt}\frac{d^2y}{dt^2} - \frac{d^2x}{dt^2}\frac{dy}{dt}}{(dx/dt)^3}$

C. $\frac{d^2y}{dt^2} / \frac{d^2x}{dx^2}$

D. None

Answer: B

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23. If $y^2 = p(x)$ is a polynomial of degree 3 , then what is $2\frac{d}{dx}\left[y^3\frac{d^2y}{dx^2}\right]$ equal to

A. $P'''(x) + P'(x)$

B. $P'''(x)P'''(x)$

C. $P(x)P'''(x)$

D. a constant

Answer: C

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24. if $x = t + \frac{1}{t}, y = t - \frac{1}{t}$, then $\frac{d^2y}{dx^2}$ is equal to

A. $-4t\left(t^2-1\right)^{-2}$

B. $-4t^3\left(t^2-1\right)^{-3}$

C. $\left(t^2+1\right)\left(t^2-1\right)^{-1}$

D. $-4t^2\left(t^2-1\right)^{-2}$

Answer: B

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25. If $y = e^{2x}$ then $\frac{d^2y}{dx^2} \cdot \frac{d^2x}{dy^2}$ is equal to

A. e^{-2x}

B. $-2e^{-2x}$

C. $2e^{-2x}$

D. 1

Answer: B

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26. If $y = \frac{1}{2}x\sqrt{(x^2 + a^2)} + \frac{1}{2}a^2 \log\left[x + \sqrt{x^2 + a^2}\right]$, then $\frac{dy}{dx}$=

A. $x\sqrt{(x^2 + a^2)}$

B. $\frac{1}{2}\sqrt{(x^2 + a^2)}$

C. $\sqrt{(x^2 + a^2)}$

D. None of these

Answer: C

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27. if $Y = \log\left(\frac{1 + \sqrt{x}}{1 - \sqrt{x}}\right)$ then $\frac{dy}{dx} =$

A. $\frac{1}{\sqrt{x}(1+x)}$

B. $\frac{1}{\sqrt{x}(1-x)}$

C. $\frac{\sqrt{x}}{1+x}$

D. None

Answer: B

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28. If f(x) $= \log_{x^2}(\log x)$ then $f'(x)$ at x=e is

A. 0

B. 1

C. $1/E$

D. $1/2e$

Answer: D

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29. If $\log_x(\log x)$, then $f'(x)$ at x=e is

A. e

B. $\frac{1}{e}$

C. $\frac{2}{e}$

D. 0

Answer: B

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30. If $Y = \log_7(\log_7 x)$, then $\frac{dy}{dx}$ =

A. $\frac{1}{\log 7.\, x \log x}$

B. $\frac{\log 7}{\log x}$

C. $\frac{x \log x}{\log 7}$

D. None

Answer: A

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31. if $f(x) = \log_5 \log_3 x,$ then $f'(e)$ is

A. $e \log 5$

B. $-e \log 5$

C. $\frac{1}{e \log 5}$

D. None

Answer: C

Watch Video Solution

32. If $y = \log x^x$, then $\frac{dy}{dx} =$

A. 1

B. log x

C. log (ex)

D. None

Answer: C

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33. If $Y = f\left(\frac{2x-1}{x^2+1}\right)$ and $f'(x) = \sin x^2$, then $\frac{dy}{dx}$ at $x = 0$ equals

A. $\frac{1}{2}\sin 1$

B. $\sin 1$

C. $2\sin 1$

D. None of these

Answer: C

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34. if $y = x + e^x$, then $\frac{d^2x}{dy^2}$ is

A. e^x

B. $-\frac{e^x}{(1+e^x)^3}$

C. $-\frac{e^x}{(1+e^x)^2}$

D. $\frac{1}{(1+e^x)^2}$

Answer: B

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35. If $y = Ke^{x/(x-a)}$ then $\frac{dy}{dx}$ is equal to

A. $a(x-a)^2$

B. $-\frac{ay}{(x-a)^2}$

C. $a^2(x-a)^2)$

D. None of these

Answer: B

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36. If $x^p y^q = (x+y)^{p+q}$, then $\frac{dy}{dx}$ is equal to also show that $\frac{d^2y}{dx^2} = 0$

A. $\frac{y}{x}$

B. $\frac{py}{q}x$

C. $\frac{x}{y}$

D. $q\frac{y}{px}$

Answer: A

Watch Video Solution

37. If $\sin^{-1}\left(\frac{x^2-y^2}{x^2+y^2}\right) = \log a$ then $\frac{dy}{dx}$ equals

A. $\frac{x}{y}$

B. $\frac{y}{x^2}$

C. $\frac{x^2 - y^2}{x^2 + y^2}$

D. $\frac{y}{x}$

Answer: D

Watch Video Solution

38. If $y = \left(1 + x^{1/4}\right)\left(1 + x^{1/2}\right)\left(1 - x^{1/4}\right)$, then what is $\frac{dy}{dx}$ equal to ?

A. $\sqrt{x}$

B. x

C. -1

D. 1

Answer: C

Watch Video Solution

39. If $y^{\frac{1}{m}} = x + \sqrt{1 + x^2} \text{then} \left(1 + x^2\right) y_2 + x y_1 = ?$

A. $m^2 y$

B. $m y^2$

C. $x^2 y^2$

D. None of these

Answer: A

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40. if $y = \left\{x + \sqrt{\left(x^2 + a^2\right)}\right\}^n$ then $\frac{dy}{dx}$ =

A. $\frac{nx}{\sqrt{(x^2 + a^2)}}$

B. $\frac{n}{\sqrt{(x^2 + a^2)}}$

C. $\frac{ny}{\sqrt{(x^2 + a^2)}}$

D. none

Answer: C

Watch Video Solution

41. if $e^y + xy = e$ then the value of $\frac{d^2y}{dx^2}$ for x=0 is

A. $1/e$

B. $1/e^2$

C. $1/e^3$

D. None of these

Answer: B

Watch Video Solution

42. if $\sqrt{x+y} + \sqrt{y-x} = c$ then $\frac{d^2y}{dx^2}$ equals

A. $2/c$

B. $-2/c^2$

C. $2/c^2$

D. None of these

Answer: C

Watch Video Solution

43. if ϕ is inverse of f and f'(x) = $\frac{1}{1+x^n}$ thenϕ '[x] equals

A. $1+x^{n---}$

B. $1+\left[f[x]^n\right)$

C. $1+[\phi[x]]^n$

D. None of these

Answer: C

Watch Video Solution

44. if 2f (sin x) + f(cos x) = x then $\frac{d}{dx}f(x)$ Is

A. $\frac{1}{\sqrt{(1-x^2)}}$

B. $\sin x + \cos x$

C. 2

D. None

Answer: A

Watch Video Solution

45. if $f'(x) = \sin(\log x)$ and $y = f\left(\frac{2x+3}{3-2x}\right)$ then $\frac{dy}{dx}$ equals

A. $\sin(\log x)\frac{1}{x\log x}$

B. $\frac{12}{(3-2x)^2}\sin\left[\log\left(\frac{2x+3}{3-2x}\right)\right]$

C. $\sin\left[\log\left(\frac{2x+3}{3-2x}\right)\right]$

D. None of these

Answer: B

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46. If for a continuous function $f, f(0) = f(1) = 0, f'(1) = 2$ and $g(x) = f(e^x)e^{f(x)}$, then g'(0) is equal to

A. 1

B. 2

C. 0

D. None of these

Answer: B

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47. Let $F(x) = \left(f\left(\frac{x}{2}\right)\right)^2 + \left(g\left(\frac{x}{2}\right)\right)^2 . F(5) = 5$ and $f''(x) = -f(x), g(x) = f'(x)$, then $F(10)$ is equal to:

A. 5

B. 10

C. 0

D. 3

Answer: A

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48. f and g are two differentiable functions which satisfy the condition $g'(a) = 2, g(a) = b$ and $(fog) = I$ identity function , then f'(b) is equal to

A. $\frac{2}{3}$

B. $\frac{1}{2}$

C. 2

D. None

Answer: B

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49. $Y_1 = \frac{dy}{dx}$ and $Y_2 = \frac{d^2y}{dx^2}$. If $Y = \sin\left(m \sin^{-1} x\right)$, then $\left(1 - x^2\right)y_2 - xy_1 + m^2 y =$

A. 1

B. -1

C. 0

D. 2

Answer: C

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50. If $Y = \left(\sin^{-1} x\right)^2 + \left(\cos^{-1} x\right)^2$, then $\left(1 - x^2\right)\frac{d^2y}{dx^2} - x\frac{dy}{dx} =$

A. 0

B. 1

C. 4

D. 3

Answer: C

Watch Video Solution

51. If $y = \left(\sin^{-1} x\right)^2 + \left(\cos^{-1} x\right)^2$ then $\left(1 - x^2\right)\frac{d^2y}{dx^2} - x\frac{dy}{dx} =$

A. 2

B. 1

C. -1

D. 0

Answer: D

View Text Solution

52. Differential coefficient of $\log_{10} x \quad w.r.t \quad \log_x 10$ is

A. $-\frac{(\log x)^2}{(\log 10)^2}$

B. $\frac{(\log_{10} x)^2}{(\log 10)^2}$

C. $\frac{\log_x 10}{\log 10}$

D. $-\frac{(\log 10)^2}{(\log x)^2}$

Answer: A

Watch Video Solution

53. If $Y = \log\left[\sec\left(e^{x^2}\right)\right]$ then $\frac{dy}{dx}$ is equal to

A. $2x\left(\tan e^{x^2}\right)e^{x^2}$

B. $2x\left[e^{x^2}\left(\sec e^{x^2}\right)\left(\tan e^{x^2}\right)\right.$

C. $x^2 e^{x^2} \tan e^{x^2}$

D. $e^{x^2} \tan e^{x^2}$

Answer: A

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54. If $x = \sqrt{\frac{1-t^2}{1+t^2}}$ and $y = \left(\sqrt{1+t^2} - \sqrt{1-t^2}\right)$ then the value of $\frac{d^2y}{dx^2}$ at t=0 is given by

A. 0

B. $1/2$

C. 1

D. -1

Answer: B

View Text Solution

55. If $f(x) = \Sigma_{r=1}^{n}[\cos(2r-1)x + I\sin(2r-1)x]$ then [Re f(x)]" + I [I m f (x)]" f(x)] " is equal to

A. $n^2 f(x)$

B. $-n^2 f(x)$

C. $n^4 f(x)$

D. $-n^4 f(x)$

Answer: D

View Text Solution

56. if $x = f(t)\cos t - f'(t)\sin t$ and $y = f(t)\sin t + f'(t)\cos t$, $then\left(\frac{dx}{dt}\right)^2 +$ (

=

A. $f - f''$

B. $(f - f'')^2$

C. $(f + f'')^2$

D. None

Answer: C

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57. If $x = \sec\theta - \cos\theta$ and $y = \sec^n\theta - \cos^n\theta$, then $(x^2+4)\left(\frac{dy}{dx}\right)^2 = n^2(y^2+4)$

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58. If $x = \cos^{-1}\frac{1}{\sqrt{(t^2+1)}}. Y = \sin^{-1}\frac{t}{\sqrt{(1+t^2)}}$ then $\frac{dy}{dx}$ in independent of t .

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59. If $x^2 + y^2 = t - \frac{1}{t}, x^4 + y^4 = t^2 + \frac{1}{t^2}$, prove that $x^3 y \frac{dy}{dx} = 1$

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60. If $\phi(x) = f(x)g(x)$, where $f'(x)g'(x) = c$ then $\frac{\phi''}{\phi} = \frac{f''}{f} + \frac{g''}{g} + \frac{2c}{fg}$ true of false ?

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61. If $y = \log_{10} x + \log_x 10 + \log_x x - \log_{10} 10$, then $\frac{dy}{dx} = \ldots.$

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62. If $x = \frac{3at}{1+t^3}, y = \frac{3at^2}{1+t^3}$ then $\frac{dy}{dx} = \ldots..$

Watch Video Solution

63. If $y = \sqrt{x + \sqrt{y + \sqrt{x + \sqrt{y + \ldots \infty}}}}$, then $\frac{dy}{dx}$ is equal to

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64. If $xe^{xy} = y + \sin^2 x$ then at $x = 0$, $\frac{dy}{dx} = \ldots .$

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Problem Set 3

1. If $2^x + 2^y = 2^{x+y}$, then $\frac{dy}{dx}$ is equal to

A. $(2^x + 2^y)/(2^y - 2^y)$

B. $\frac{2^y(1 - 2^y)}{2^x(2^x - 1)}$

C. $\frac{2^x(1 - 2^y)}{2^y(2^x - 1)}$

D. $\left(2^{x+y} - 2^x\right)/2^y$

Answer: C

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2. If $x^2 + y^2 = 1$ then

A. $yy' - 2(y')^2 + 1 = 0$

B. $yy'' + (y')^2 + 1 = 0$

C. $Yy' - (y')^2 - 1 = 0$

D. $yY' + 2(y')^2 + 1 = 0$

Answer: B

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3. If $\sin(x + y) = \log(x + y)$, then dy/dx =

A. 2

B. -2

C. 1

D. -1

Answer: D

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4. The value of $\frac{d}{dx}(x^x)$ is

A. xx^{x-1}

B. $x^x \log ex$

C. $x^x \log x$

D. None of these

Answer: B

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5. If $f(x) = x^{1/x}$, then f' ' (e) is equal to

A. $e^{1/e}$

B. $e^{1/e} - 2$

C. $2^{1/(e-3)}$

D. $-e^{(1/e-3)}$

Answer: D

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6. If $y = (x^x)^x$ then $\frac{dy}{dx}$ =

A. $xy(1 + \log x)$

B. $XY(1 + 2\log x)$

C. $\frac{x}{y}(1 + \log X)$

D. $\frac{x}{y}(1 + 2\log x)$

Answer: B

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7. If $y = x^y$, then $x(1 - y\log x).\ \frac{dy}{dx} =$

A. x^2

B. y^2

C. xy^2

D. None of these

Answer: B

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8. $\log(x + y) - 2xy = 0$ then $y'(0) =$

A. 1

B. -1

C. 2

D. 0

Answer: A

Watch Video Solution

9. If $y = \sqrt{x}^{\sqrt{x}^{\sqrt{x}\ldots\infty}}$ then prove that `dy/dx=(y^2)/(x(2-y log x)).

A. xy^2

B. $\frac{y^2}{x}$

C. y^2

D. None

Answer: B

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10. if $x^2e^y + 2xye^x + 13 = 0$ then dy/dx =

A. $-\dfrac{2xe^{y-x} + 2y(x+1)}{x(xe^{y-x} + 2)}$

B. $\dfrac{2xe^{x-y} + 2y(x+1)}{x(xe^{y-x} + 2)}$

C. $-\dfrac{2xe^{x-y} + 2y(x+1)}{x(xe^{x-y} + 2)}$

D. None of these

Answer: A

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11. if $y = a^{x^{a^{x^{\cdots\infty}}}}$, then $x(1 - y\log x\log y)\dfrac{dy}{dx} =$

A. $y^2\log y$

B. $y\log y$

C. $y^2/\log y$

D. None

Answer: A

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12. if $y = x^{(\log x)^{\log(\log x)}}$ and if $k = \frac{y \log y}{x \log x}$ then $\frac{dy}{dx} =$

A. $k(2 \log \log x + 1)$

B. $\frac{1}{k}(2 \log \log x + 1)$

C. $2k[\log \log x + 1]$

D. $\frac{1}{2k}(2 \log \log x + 1)$

Answer: A

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13. if $y = \left(\tan^{\tan x} x\right)^{\tan x}$ then at $x = \frac{\pi}{4}$, $\frac{dy}{dx}$=

A. 0

B. 1

C. 2

D. None

Answer: C

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14. If $y = (1+x)(1+x^2)(1+x^4).....(1+x^{2n})$, then at $x = 0, \frac{dy}{dx}$=

A. -1

B. 0

C. 1

D. None

Answer: C

Watch Video Solution

15. if $x^y . Y^x = 1$ then $\frac{dy}{dx}$ =

A. $\frac{y(y + x\log y)}{x(y\log x + x)}$

B. $\frac{y(x + y\log x)}{x(y + x\log y)}$

C. $-\frac{y(y + x\log y)}{x(x + y\log x)}$

D. None of these

Answer: C

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16. If $y = e^{x + e^{x + e^{x \cdots \infty}}}$, then $dy/dx =$

A. $\frac{1}{1 - y}$

B. $\frac{y}{1 - y}$

C. $\frac{2y}{1 - y}$

D. None

Answer: B

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17. If $x = e^{y+e^{y+e^{y+\ldots\infty}}}$, x $>$ 0 then $\frac{dy}{dx}$=

A. $\frac{x}{1+x}$

B. $\frac{1}{x}$

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

D. $\frac{1+x}{x}$

Answer: C

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18. if $f(x) = |\cos x|$ then $f'\left(\frac{3\pi}{4}\right)$ is

A. $-\frac{1}{\sqrt{2}}$

B. $\frac{1}{\sqrt{2}}$

C. 1

D. None

Answer: B

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19. If $y = |x|^{|\sin x|}$ then the value of $\frac{dy}{dx}$ at $x = -\frac{\pi}{4}$ is equal to

A. $-\left(\frac{\pi}{4}\right)^{1/\sqrt{2}}\left[\frac{1}{\sqrt{2}}\log\frac{4}{\pi}+\frac{2\sqrt{2}}{\pi}\right]$

B. $\left(\frac{\pi}{4}\right)^{1/\sqrt{2}}\left[\frac{1}{\sqrt{2}}\log\frac{4}{\pi}+\frac{2\sqrt{2}}{\pi}\right]$

C. $\left(\frac{\pi}{4}\right)^{1/\sqrt{2}}\left[\frac{1}{\sqrt{2}}\log\frac{\pi}{4}-\frac{2\sqrt{2}}{\pi}\right]$

D. $\left(\frac{\pi}{4}\right)^{1/\sqrt{2}}\left[\frac{1}{\sqrt{2}}\log\frac{\pi}{4}+\frac{2\sqrt{2}}{\pi}\right]$

Answer: A

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20. If $y\cos x + x\cos y = \pi$, then $y''(0)$ is

A. 1

B. π

C. 0

D. $-\pi$

Answer: B

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21. If $x^y = y^x$, then $\frac{dy}{dx} = \frac{y(x\log y - y)}{x(y\log x - x)}$

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22. $y = \left(\tan x^{\tan x}\right)^{\tan x}$, then $\frac{dy}{dx}$ =1 at $x = \frac{\pi}{4}$

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23. If $y = (\sin x)^{\sin x^{\sin x} \ldots \cdot \infty}$ then prove that $\frac{dy}{dx} = \frac{y^2 \cot x}{1 - y \log(\sin x)}$

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24. If $x^y + y^x = a^6$, then $\frac{dy}{dx}$= . . . . . .

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Self Assessment Test

1. Let $y = \sin^{-1} \frac{2x}{1 + x^2}$ where $0 < x < 1$ and $0 < y < \frac{\pi}{2}$ then $\frac{dy}{dx}$ is equal to

A. $\frac{2}{1 + x^2}$

B. $\frac{2x}{1 + x^2}$

C. $\frac{1}{1 + x^2}$

D. $\frac{-x}{1+x^2}$

Answer: A

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2. If $y = \sin^n x \cos nx$ then $\frac{dy}{dx}$ =

A. $n \sin^{n-1} x \cos(n+1)x$

B. $n \sin^{n-1} x \sin(n+1)x$

C. $n \sin^{n-1} x \cos(n-1)x$

D. $n \sin^{n-1} x \cos nx$

Answer: A

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3. if $x = t + \frac{1}{t}, y = t - \frac{1}{t}$, then $\frac{d^2y}{dx^2}$ is equal to

A. $-4t\left(t^2-1\right)^{-2}$

B. $-4t^3\left(t^2-1\right)^{-3}$

C. $\left(t^2+1\right)\left(t^2-1\right)^{-1}$

D. $-4t^2\left(t^2-1\right)^{-2}$

Answer: B

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4. Given the parametic equations $x=f(t), y=g(t)$ then $\frac{d^2y}{dx^2}$ equals

A. $\frac{\frac{d^2y}{dt^2}\cdot\frac{dx}{dt}-\frac{dy}{dt}-\frac{dy}{dt}\frac{d^2x}{dt^2}}{(dx/dt)^2}$

B. $\frac{\frac{dx}{dt}\frac{d^2y}{dt^2}-\frac{d^2x}{dt^2}\frac{dy}{dt}}{(dx/dt)^3}$

C. $\frac{d^2y}{dt^2}/\frac{d^2x}{dx^2}$

D. None

Answer: B

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5. if $2^x + 2^y = 2^{x+y}$, then $\frac{dy}{dx}$ Is equal to

A. $(2^x + 2^y) / (2^y - 2^y)$

B. $(2^x + 2^y) / (1 + 2^{x+y})$

C. $2^{x+y} \cdot \frac{2^y - 1}{1 - 2^x}$

D. $(2^{x+y} - 2^x) / 2^y$

Answer: C

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6. The differential coefficient of log tan x is

A. $2 \sec 2x$

B. $2\text{cosec}2x$

C. $2 \sec^3 x$

D. $2 \operatorname{cosec}^3 x$

Answer: B

Watch Video Solution

7. The differential coefficient of f(log (x)) where $f(x) = \log x$ is

A. $x / \log x$

B. $\log x / x$

C. $1 / x . \log x$

D. None of these

Answer: C

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8. If $y^2 = p(x)$ is a polynomial of degree 3 , then what is $2\frac{d}{dx}\left[y^3\frac{d^2y}{dx^2}\right]$ equal to

A. $P'''(x) + p'(x)$

B. $(p''(x)P'''(x)$

C. $P(x)P'''(x)$

D. `A constant

Answer: C

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9. Differentiate $x = 3\cos\theta - 2\cos^3\theta, y = 3\sin\theta - 2\sin^3\theta$

A. $\sin\theta$

B. $\cos\theta$

C. $\tan\theta$

D. $\cot\theta$

Answer: D

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10. A point of the parabola $y^2 = 18x$ at which the ordinate increases at twice the rate of abscissa is :

A. $(2, 4)$

B. $(2, -4)$

C. $\left(-\frac{9}{8}, \frac{9}{2}\right)$

D. $\left(\frac{9}{8}, \frac{9}{2}\right)$

Answer: D

Watch Video Solution

11. If $y = \log_y x, then \frac{dy}{dx} =$

A. $\frac{1}{x + \log y}$

B. $\frac{1}{\log x(1 + y)}$

C. $\frac{1}{x(1 + \log y)}$

D. $\frac{1}{y + \log x}$

Answer: C

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12. If $y = x^{e^x}$, then $\frac{dy}{dx} =$

A. $y(\log x + e^x)$

B. $y \log x \left(\frac{1}{2} + e^x\right)$

C. $ye^x(\log x + x)$

D. $ye^x\left(\log x + \frac{1}{x}\right)$

Answer: D

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13. if $x = e^{y+e^{y+e^{y+\cdots\infty}}}$, $x > 0$ then $\left(\frac{dy}{dx}\right. =$

A. $\frac{x}{1+x}$

B. $\frac{1}{x}$

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

D. $\frac{1+x}{x}$

Answer: C

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14. $\frac{d^2x}{dy^2}$ equals

A. $\left(\frac{d^2y}{dx^2}\right)^{-1}$

B. $-\left(\frac{d^2y}{dx^2}\right)^{-1}\left(\frac{dy}{dx}\right)^{-3}$

C. $\left(\frac{d^2y}{dx^2}\right)\left(\frac{dy}{dx}\right)^{-2}$

D. $-\left(\frac{d^2y}{dx^2}\right)\left(\frac{dy}{dx}\right)^{-3}$

Answer: D

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15. $\frac{d}{dx}\tan^{-1}(\sec x+\tan x)$=

A. 1

B. $1/2$

C. 2

D. None of these

Answer: B

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16. If $y = \sqrt{\frac{1+\tan x}{1-\tan x}}$, then $\frac{dy}{dx} =$

A. $\frac{1}{2}\sqrt{\frac{1-\tan x}{1+\tan x}}\sec^2\left(\frac{\pi}{4}+x\right)$

B. $\sqrt{\frac{1-\tan x}{1+\tan x}}\sec^2\left(\frac{\pi}{4}+x\right)$

C. $\frac{1}{2}\sqrt{\frac{1-\tan x}{1+\tan x}}\sec\left(\frac{\pi}{4}+x\right)$

D. None of these

Answer: A

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17. The differential coefficient of the function $|x-1|+|x-3|$ at the point $x = 2$ is

A. 2

B. 0

C. -2

D. 4

Answer: B

Watch Video Solution

18. if $x = \frac{1-t^2}{1+t^2}$ and $y = \frac{2t}{1+t^2}$, then $\frac{dy}{dx} =$

A. $-\frac{y}{x}$

B. $\frac{x}{y}$

C. $-\frac{x}{y}$

D. $\frac{y}{x}$

Answer: C

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19. The differental equation satisfied by the function $y = \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x + \ldots + \infty}}}$ is

A. $y = \dfrac{dy}{dx} - \sin x = 0$

B. $(2y-1)\cos x + \dfrac{dy}{dx} = 0$

C. $(2y-1)\cos x - \dfrac{dy}{dx} = 0 (2y-1)\dfrac{dy}{dx} - \cos x = 0$

D. $(2y-1)\dfrac{dy}{dx} - \cos x = 0$

Answer: D

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20. $\dfrac{d}{dx}\left[\sin^2 \cot^{-1}\sqrt{\dfrac{1-x}{1+x}}\right]$ equals

A. $-\dfrac{1}{2}$

B. $\dfrac{1}{2}$

C. 1

D. -1

Answer: B

Watch Video Solution

21. $\frac{d^2x}{dy^2}$ is equal to :

A. $\frac{1}{(dy/dx)^2}$

B. $\frac{\left(d^2y/dx^2\right)}{\frac{dy}{(dx)^2}}$

C. $\frac{d^2y}{dx^2}$

D. $\left[\frac{-d^2y/dx^2}{\left(\frac{dy}{dx}\right)^3}\right]$

Answer: D

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22. If $y = \sec\left(\tan^{-1} x\right)$ then $\frac{dy}{dx}$ at $x = 1$ is equal to

A. $\frac{1}{\sqrt{2}}$

B. $\frac{1}{2}$

C. $\sqrt{2}$

D. 1

Answer: A

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Mescellaneous Exercise

1.

List-A	List-B
(a) If $y = \sin^{-1}\frac{2x}{1+x^2} + \sec^{-1}\frac{1+x^2}{1-x^2}$, then $\frac{dy}{dx} =$	1. $\frac{y}{x}$
(b) If $y = \tan^{-1}\left[\frac{\sqrt{1+x^2}+\sqrt{1-x^2}}{\sqrt{1+x^2}-\sqrt{1-x^2}}\right]$, then $\frac{dy}{dx} = \ldots$	2. $xy\,(1+2\log x)$
(c) If $x^y = e^{x-y}$, then $\frac{dy}{dx} = \ldots$	3. $\frac{4}{1+x^2}$
(d) If $x^p\, y^q = (x+y)^{p+q}$, then $\frac{dy}{dx} = \ldots$	4. $\frac{\log x}{(1+\log x)^2}$
(e) If $y = (x^x)^x$ then $\frac{dy}{dx} = \ldots$	5. $-\frac{x}{\sqrt{1-x^4}}$

View Text Solution

2.

List-A	List-B
(a) If $x = t - \frac{1}{t}, y = t + \frac{1}{t}$, then $\frac{dy}{dx} =$	1. $\frac{3}{\sqrt{9 - x^2}}$
(b) If $y = \left[\cos^2 \tan^{-1} \sqrt{\frac{1+x}{1-x}}\right]$, then $\frac{dy}{dx} =$	2. $\sin 2y \,(\cot x - 2 \sin 2x)$
(c) If $\sqrt{\tan y} = e^{\cos 2x} \sin x$, then $\frac{dy}{dx} =$	3. $\frac{x}{y}$
(d) If $xy = (x+y)^p$ and $\frac{dy}{dx} = \frac{y}{x}$, then $p =$	4. $\frac{1}{2}$
(e) If $y = \sin^{-1}\left(x - \frac{4}{27}x^3\right)$, then $\frac{dy}{dx} =$	5. 2

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3.

List-A	List-B
(a) If $x = a\cos t, y = a \sin t$	(p) $y_2 = -\frac{4}{a}$ at $t = \frac{\pi}{3}$
(b) $x = a\cos^3 t, y = a\sin^3 t$	(q) $y_2 = 0$ at $t = \frac{\pi}{6}$
(c) $x = \cos^2 t, y = \sin^2 t$	(r) $y_2 = -\frac{1}{a}$ at $t = \frac{\pi}{2}$
(d) $x = a(t - \sin t), y = a(1 - \cos t)$	(s) $y_2 = \frac{4\sqrt{2}}{3a}$ at $t = \frac{\pi}{4}$

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