MATHS

BOOKS - TARGET MATHS (HINGLISH)

DIFFERENTIATION

CLASSICAL THINKING

1. Let $f(x) = \begin{cases} x + 1 & \text{where } x < 2 \\ 2x - 1 & \text{where} x \geq 2 \end{cases}$ then f'(2) is equal to

A. 0

B. 1

C. 2

D. does not exist

Answer: D

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2. If f(x) $= \begin{cases} x+2 & f \text{ or } -2 < x < 3 \\ 5 & f \text{ or } x = 3 \\ 8-x & f \text{ or } x > 3 \end{cases}$,then at x=3 , $f'(x)$ =

A. 1

B. -1

C. 0

D. does not exist

Answer: D

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3. The derivative of $|x|$ at x = 0

A. 1

B. 0

C. -1

D. does not exist

Answer: D

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4. A function f (x) is defined by :

$$f(x) = \begin{cases} px^2 + 1 & \text{for} x < 1 \\ x + p & \text{for} x > 1 \end{cases}$$

if f (x) be differentiable at x = 1 then p =

A. 2

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

C. -2

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

Answer: B

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5. If $f(x) = \begin{cases} x & \text{when } 0 \leq x \leq 1 \\ 2x - 1 & \text{when } x > 1 \end{cases}$ then -

A. f(x) is not differentiable at x = 1

B. f(x) is not continuous at x = 1

C. f(x) is differentiable at x = 1

D. f(x) is neither continuous nor differentiable at x = 1

Answer: A

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6. If f(x) = $\begin{cases} 1 + x & \text{for } x \leq 2 \\ 5 - x & \text{for } x > 2 \end{cases}$, *then*

A. differentiable at x = 2 but not continuous at x = 2

B. continuous at x = 2 but not differentiable at x = 2

C. continuous and differentiable at x = 2

D. neither continuous nor differentiable at x = 2

Answer: B

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7. Let $f(x) = \begin{cases} x^n \sin \frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$ Then f(x) is continuous but not differentiable at x=0. If

A. differentiable at x = 0 but not continuous at x = 0

B. continuous at x = 0 but not differentiable at x = 0

C. continuous and differentiable at x = 0

D. neither continuous nor differentiable at x = 0

Answer: B

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8. $\frac{d}{dx}[\sin(2x + 3)]=$

A. cos (2x + 3)

B. $2\cos(2x + 3)$

C. $-\cos(2x + 3)$

D. $3\cos(2x + 3)$

Answer: B

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9. if $y = e^{\sqrt{x}}$, then $\frac{dy}{dx}$ equals

A. $\frac{e^{\sqrt{x}}}{2\sqrt{x}}$

B. $\frac{\sqrt{x}}{e^{\sqrt{x}}}$

C. $\frac{x}{e^{\sqrt{x}}}$

D. $\frac{2\sqrt{x}}{e^{\sqrt{x}}}$

Answer: A

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10. $\frac{d}{dx}\left(e^{x^3}\right)$ is equal to

A. $3xe^{x^3}$

B. $3x^2e^{x^3}$

C. $3x\left(e^{x^3}\right)^2$

D. $2x^2e^{x^3}$

Answer: B

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11. Derivative of $(\log x)^4$ is

A. $4(\log x)^3$

B. $\frac{4(\log x)^3}{3}$

C. $(\log x)^3$

D. $\frac{4(\log x)^3}{x}$

Answer: D

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12. $\frac{d}{dx}[\log(\log x)] =$

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

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

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

D. $x\log x$

Answer: C

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13. Q. if $y = \log_{10} x$, then $\frac{dy}{dx}$ is equal to -

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

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

C. $\frac{1}{|x| \log_e 10}$

D. $\frac{1}{x \log_e 10}$

Answer: D

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14. If $y = f\left(ax^2 + b\right)$, then $\frac{dy}{dx}$ is equal to

A. $2ax^2 f'\left(ax^2 + b\right)$

B. $2axf'\left(ax^2+b\right)$

C. $f'\left(ax^2+b\right)$

D. $ax^2f'\left(ax^2+b\right)$

Answer: B

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15. $y=\left(4x^3-5x^2+1\right)^4$, Find $\frac{dy}{dx}$.

A. $4\left(4x^3-5x^2+1\right)^3\left(12x^2-10x\right)$

B. $4\left(4x^3+5x^2+1\right)^3\left(12x^2+10x\right)$

C. $4\left(3x^4-5x^2+1\right)^3\left(12x^2-10x\right)$

D. $4\left(3x^4+5x^2+1\right)^3\left(12x^2+10x\right)$

Answer: A

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16. $\frac{d}{dx}\left(x^2 + \cos x\right)^4 =$

A. $4\left(x^2 + \cos x\right)(2x - \sin x)$

B. $4\left(x^2 - \cos x\right)^3(2x - \sin x)$

C. $4\left(x^2 + \cos x\right)^3(2x - \sin x)$

D. $4\left(x^2 + \cos x\right)^3(2x + \sin x)$

Answer: C

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17. If $y = \frac{u - 1}{u + 1}$ and $u = \sqrt{x}$, then $\frac{dy}{dx}$ is

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

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

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

D. $\sqrt{x}\left(1+\sqrt{x}\right)^2$

Answer: A

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18. If $y = \log\left(\tan\sqrt{x}\right)$, then the value of $\frac{dy}{dx}$ is

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

B. $\frac{\sec^2\sqrt{x}}{\sqrt{x}\tan x}$

C. $2\sec^2\sqrt{x}$

D. $\frac{\sec^2\sqrt{x}}{2\sqrt{x}\tan\sqrt{x}}$

Answer: D

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19. If $y = \log(\sec x + \tan x)$, then $\frac{dy}{dx} =$

A. cos x

B. sec x

C. tan x

D. cot x

Answer: B

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20. If $y = \log\left(\log\left(\log x^3\right)\right)$ then $\frac{dy}{dx} =$

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

B. $\frac{1}{\log\left(\log\left(\log x^3\right)\right)}$

C. $\frac{1}{x \log x \log\left(\log x^3\right)}$

D. $\frac{1}{x \log\left(\log x^3\right)}$

Answer: C

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21. Prove that $\frac{d}{dx}\left(\cos^{-1} x\right) = \frac{1}{\sqrt{1 - x^2}}$, where $x \in [-1, 1]$.

A. $-1 < x < 1$

B. $-1 \leq x < 1$

C. $-1 \leq x \leq 1$

D. $-1 < x \leq 1$

Answer: A

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22. $\frac{d}{dx}\left[\tan^{-1}\left(\sqrt{x}\right)\right]=$

A. $\sec^{-1}x$

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

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

D. $\frac{2\sqrt{x}}{1+x}$

Answer: B

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23. If $y = \cos^{-1}\left(\frac{1}{x^3}\right)$, then: $\frac{dy}{dx} =$

A. $\frac{3}{x^4 \sin\left[\cos^{-1}\left(\frac{1}{x^3}\right)\right]}$

B. $\frac{3}{x\sqrt{x^4 - 1}}$

C. $\frac{3}{x^4 \sin\left[\cos^{-1}\left(\frac{1}{x^3}\right)\right]}$

D. $\frac{3}{x\sqrt{x^6 + 1}}$

Answer: B

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

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

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

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

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

Answer: C

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25. $\frac{d}{dx}\left(\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)\right)$=..... If x is positive

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

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

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

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

Answer: C

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26. $\frac{d}{dx}cosec^{-1}\left(\frac{1+x^2}{2x}\right)$

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

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

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

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

Answer: B

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

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

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

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

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

Answer: A

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28. Derivative of $y = \sec^{-1}\left(\frac{1}{2x^2 - 1}\right)$ is

A. $\frac{dy}{dx} = \frac{\sqrt{1 - x^2}}{2}, x \neq \pm 1$

B. $\frac{dy}{dx} = \frac{-2}{\sqrt{1 - x^2}}, x \neq \pm 1$

C. $\frac{dy}{dx} = \frac{2}{\sqrt{1 - x^2}}, x \neq \pm 1$

D. None of these

Answer: B

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29. $\frac{d}{dx}\left(e^{x\sin x}\right) =$

A. $e^{x\sin x}(x\cos x + \sin x)$

B. $e^{x\sin x}(\cos x + \sin x)$

C. $e^{x\sin x}(\cos x + \sin x)$

D. $e^{x\sin x}(x\cos x - \sin x)$

Answer: A

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30. $\frac{d}{dx}\left(x^x\right) = ?$

A. xx^{x-1}

B. $x^x \log ex$

C. $x^x \log x$

D. $x^x(1 - \log x)$

Answer: B

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

A. $\log x x^{\log x - 1}$

B. $x^{\log x - 1} . 2\log x$

C. $x\log(\log x)$

D. $\frac{1}{x\log x} \cdot x^{\log x - 1}$

Answer: B

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32. If $y = x^2 + x^{\log x}$, then $\frac{dy}{dx}$ is

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

B. $2x + \frac{x}{2}\log x$

C. $2x + \frac{2}{x}\log x$

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

Answer: A

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33. If $x^{2/3} + y^{2/3} = a^{2/3}$, then $\frac{dy}{dx}$ is equal to

A. $\left(\frac{y}{x}\right)^{\frac{2}{3}}$

B. $-\left(\frac{y}{x}\right)^{\frac{1}{3}}$

C. $\left(\frac{x}{y}\right)^{\frac{1}{3}}$

D. $-\left(\frac{x}{y}\right)^{\frac{1}{3}}$

Answer: B

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34. If $x^3 + y^3 = 3axy$, find $\frac{dy}{dx}$.

A. $\frac{ay - x^2}{y^2 - ax}$

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

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

D. $\frac{x^2 + ay}{ax - y^2}$

Answer: A

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35. If $x^3 + 8xy + y^3 = 64$, then $\frac{dy}{dx}$ =

A. $-\frac{3x^2 + 8y}{8x + 3y^2}$

B. $\frac{3x^2 + 8y}{8x + 3y^2}$

C. $\frac{3x + 8y^2}{8x^2 + 3y^2}$

D. $-\frac{3x + 8y^2}{8x^2 + 3y^2}$

Answer: A

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36. If $y = \cos(x + y)$, then $\frac{dy}{dx} =$

A. $\frac{\cos(x + y)}{1 + \sin(x + y)}$

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

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

D. $\frac{\sin x + \sin y}{\sin y - x}$

Answer: C

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37. If $\sin^2 x + 2\cos y + xy = 0$ then $\frac{dy}{dx} =$

A. $\frac{y + 2\sin\theta}{2\sin y + x}$

B. $\frac{y + \sin 2x}{2\sin y - x}$

C. $\frac{y + 2\sin x}{\sin y + x}$

D. $\frac{y + \sin 2x}{\sin y - x}$

Answer: B

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38. $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$

A. $-\frac{ax + hy + g}{hx + by + f}$

B. $\frac{ax + hy + g}{hx - by + f}$

C. $\frac{ax - hy - g}{hx - by - f}$

D. $\frac{ax + hy + g}{hx + by + f}$

Answer: A

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39. For the curve $\sqrt{x} + \sqrt{y} = 1$, $\frac{dy}{dx}$ at $(1/4,\ 1/4)$ is $1/2$ (b) 1 (c) -1 (d) 2

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

B. 1

C. -1

D. 2

Answer: C

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40. If $x = a\cos\theta$ and $y = b\sin\theta$, find $\frac{dy}{dx}$

A. $\left(-\frac{b}{a}\right)\cot\theta$

B. $\left(-\frac{a}{b}\right)\cot\theta$

C. $\cot\theta$

D. $\left(\frac{b}{a}\right)\cot\theta$

Answer: A

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41. Derivative of 5^x with respect to $\log_5 x$ is

A. $x \cdot 5^x$

B. $5^x(\log 5)^2$

C. $x \cdot 5^x(\log 5)^2$

D. $x(\log 5)^2$

Answer: C

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42. Find the derivative of $\frac{1}{1 - t^2}$ with respect to $1 + t^2$.

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

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

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

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

Answer: A

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43. Derivative of $\sin x^2$ w.r.t. x^2 is

A. x^2

B. $\cos x^2$

C. $2\sin x$

D. $\sin x$

Answer: B

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44. The differential co- efficient of e^{x^3} with respect to log x is

A. e^{x^3}

B. $3x^2e^{x^3}$

C. $3x^3e^{x^3}$

D. $3x^2e^{x^3} + 3x^2$

Answer: C

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45. The differential cofficient of $a^{\sin^{-1}x}$ w. r. t $\sin^{-1}x$ is -

A. $\frac{a^{\sin^{-1}x}}{\log a}$

B. $a^{\sin^{-1}x}\log a$

C. $\frac{a^{\sin^{-1}x}}{\log\left(\sin^{-1}x\right)}$

D. $\frac{a^{\sin^{-1}x}}{\sin^{-1}(\log a)}$

Answer: B

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46. If $x = \sec^2\theta, y = \tan^3\theta$, *then* at $\theta = \frac{\pi}{3}, \frac{dy}{dx} =$

A. $\frac{a}{b} \cdot \text{cosec}\theta$

B. $-\frac{a}{b} \cdot \cot\theta$

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

D. $\frac{a}{b} \cdot \tan\theta$

Answer: C

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47. If $x = a^2(\sin\theta + \text{cosec}\theta)y = a^2(\sin\theta - \text{cosec}\theta)$, then $\frac{dy}{dx} =$

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

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

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

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

Answer: C

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48. If $y = \log(ax + b)$, then $\frac{d^2y}{dx^2}$ is

A. $\frac{a^2}{(ax + b)^2}$

B. $-\frac{a^2}{(ax + b)^2}$

C. $\frac{1}{(ax + b)^2}$

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

Answer: B

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49. If $y = \log(\sin x)$, find $\frac{d^2y}{dx^2}$

A. $-\operatorname{cosec}^2 x$

B. $\sec^2 x$

C. $-\operatorname{cosec} x \cot x$

D. $\sec x \tan x$

Answer: A

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50. If $\sqrt{xy} = 1$, then $\frac{d^2y}{dx^2} =$

A. $2x^3$

B. $-2x^3$

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

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

Answer: D

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51. If $y = \sin mx$, then $\frac{d^2y}{dx^2} + m^2y =$

A. 1

B. $-m^2$

C. 0

D. -1

Answer: C

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52. If $y = 2\sin x + 3\cos x$, then $y + \frac{d^2y}{dx^2}$ is

A. 1

B. 0

C. 2

D. 3

Answer: B

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53. If $x = a\cos nt - b\sin nt$, $then \frac{d^2x}{dt^2}$ is n^2x (b) $-n^2x$ (c) $-nx$ (d) nx

A. n^2x

B. $-n^2x$

C. $-nx$

D. nx

Answer: B

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54. If $y = a\sin mx + b\cos mx$, then $\frac{d^2y}{dx^2}$ is equal to

A. m^2y

B. $-m^2y$

C. my

D. $-my$

Answer: B

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55. If $y = a + bx^2$, where a, b are constants, then

A. $\frac{d^2y}{dx^2} = 2$

B. $x\frac{d^2y}{dx^2} = \frac{dy}{dx}$

C. $x\frac{d^2y}{dx^2} - \frac{dy}{dx} + y = 0$

D. $x\frac{d^2y}{dx^2} = 2xy$

Answer: B

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CRITICAL THINKING

1. If f(x) = |x+3|, then f'(3)=

A. 1

B. 1

C. 0

D. does not exist

Answer: D

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2. If $f(x) = |x-2|$, then at $x=2$, $f(x)$ is

A. continous but not differentiable

B. differentiable but not continuous

C. continuous and differentiable

D. neither continous nor differentiable

Answer: A

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3. If $f(x) = \begin{cases} 2x^2 + 3x + 4 & x < 1 \\ kx + 9 - k & x \geq 1 \end{cases}$ is differentiable at x=1, then k is equal to

A. 6

B. 7

C. 4

D. 5

Answer: B

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4. The set of all points, where the function $f(x) = \frac{x}{1 + |x|}$ is differentiable, is

A. $(-\infty, \infty)$

B. $(-\infty, -1) \cup (1, \infty)$

C. $(-\infty, 0) \cup (0, \infty)$

D. $(0, \infty)$

Answer: A

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5. If f(2)=2 and f'(2)=1, and then $\lim_{x \to 2} \frac{2x^2 - 4f(x)}{x - 2}$ is equal to

A. 1

B. 2

C. 4

D. 0

Answer: C

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6. If f is derivable at x =a,then $\lim_{x \to a}\left(\frac{xf(a) - af(x)}{x - a}\right)$

A. $f(a) - af'(a)$

B. $af'(a) - f(a)$

C. $f'(a)$

D. f(a) + af'(a)

Answer: A

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7. Which one of the following isnot true always?

A. If f(x) is not continuous at x=a, then it is not differentibale at x=a

B. If f(x) is continous at x=a, then it is differentiable at x=a

C. if f(x) and g(x) are differentiable at x=a, then f(x) + g(x) is also differentiable at x=a

D. If a function f(x) is continous at x=a, then $\lim_{x \to a} f(x)$ exists

Answer: B

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8. If $f(x) = \begin{cases} x^2 \sin\left(\frac{1}{x}\right) & x \neq 0 \\ 0 & x = 0 \end{cases}$, then

A. discontinous at x=0

B. derivable at x=0

C. not derivable at x=0

D. none of these

Answer: B

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9. If $f(x) = \begin{cases} -x & \text{when } x < 0 \\ x^2 & \text{when } 0 \leq x \leq 1 \\ x^3 - x + 1 & \text{when } x > 1 \end{cases}$ then f is differentiable at

A. x=1

B. x=0

C. x=0,1

D. none of these

Answer: A

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10. If f(x) $= ax^2 + b, b \neq 0, x \leq 1 = bx^2 + ax + c, x > 1$, then f(x) is continous and differentiable at x=1, if

A. c=0, a=2b

B. a=b, c= arbitrary

C. a=b, c=0

D. a=b, $c \neq 0$

Answer: A

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11. Let $f(x) = x^{\circ} \cos\left(\frac{1}{x}\right)$, when $x \neq 0$ and f(x)=0, when x=0. Then f(x) will be differentiable at x=0, if

A. $p > 0$

B. $p > 1$

C. $0 < p < 1$

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

Answer: B

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12. At x = 0 , the function $y = e^{-|x|}$ is

A. continous and differentiable at x=0

B. neither continous nor differentiable at x=0

C. continous but not differentiable at x=0

D. not continous but differentiable at x=0

Answer: C

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13. If $f(x) = \begin{cases} xe^{-\left(\frac{1}{|x|}+\frac{1}{x}\right)} & x \neq 0 \\ 0 & x = 0 \end{cases}$ then f(x) is

A. discontinous everywhere

B. continous as well as differentiable for all x

C. continous for all x but not differentiable at x=0

D. neither differentiable nor continous at x=0

Answer: C

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14. $f(x) = \begin{cases} \frac{|x|}{x}, & x \neq 0 \\ 0, & x = 0 \end{cases}$

A. f(x) is discontinous everywhere

B. f(x) is continous everywhere

C. f'(x) exists in (-1,1)

D. f'(x) exists in (-2,2)

Answer: B

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15. If f(x) = $\begin{cases} e^x + ax & \text{for } x < 0 \\ b(x-1)^2 & \text{for } x \geq 0 \end{cases}$, is differentiable at x =0,then (a,b) is

A. (-3,-1)

B. (-3,1)

C. (3,1)

D. (3,-1)

Answer: B

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16. The value of m which the function $f(x)\begin{cases} mx^2 & \text{for } x \leq 1 \\ 2x & \text{for} x > 1 \end{cases}$ is differentiable at x= 1,is

A. 0

B. 1

C. 2

D. does not exist

Answer: D

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17. Let $f(x) = a\sin|x| + be^{|x|}$ is differentiable when

A. a=0

B. b=0

C. a-b=0

D. a+b=0

Answer: D

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DERIVATIVE OF COMPOSITE FUNCTIONS

1. The derivative of $\sqrt{\sqrt{x}+1}$ is

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2. If $y = \sec x^{\circ}$, then $\frac{dy}{dx} =$

A. sec x tan x

B. $\sec x^{\circ} \tan x^{\circ}$

C. $\frac{\pi}{180} \sec x^{\circ} \tan x^{\circ}$

D. $\frac{180}{\pi} \sec x^{\circ} \tan x^{\circ}$

Answer: C

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3. $\left[\frac{d}{dx}\left(10^{x\tan x}\right)\right]$ is equal to

A. $\tan x + x\sec^2 x$

B. $\log 10\left(\tan x + x\sec^2 x\right)$

C. $\log 10\left(\tan x + \frac{x}{\cos^2 x} + \tan x \sec x\right)$

D. x tan x log 10

Answer: B

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4. If $y = e^{\frac{x^2}{1+x^2}}$, then $\frac{dy}{dx} =$

A. $\left(2xe^{\frac{x^2}{1+x^2}}\right.$

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

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

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

Answer: A

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5. If $y = \sqrt{u}$,u=(3-2v)v and $v = x^2$, then $\frac{dy}{dx} =$

A. $\frac{4-3x^2}{\sqrt{3-2x^2}}$

B. $\frac{3+4x^2}{\sqrt{3-2x^2}}$

C. $\frac{3-4x^2}{\sqrt{3-2x^2}}$

D. $\frac{4+3x^2}{\sqrt{3-2x^2}}$

Answer: C

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6. If $y\left(\cos x^2\right)^2$, then $\frac{dy}{dx}$ is equal to

A. $-4x\sin 2x^2$

B. $-x\sin x^2$

C. $-2x\sin 2x^2$

D. $-x\cos 2x^2$

Answer: C

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7. If $y = \frac{\tan x + \cot x}{\tan x - \cot x}$, then $\frac{dy}{dx} =$

A. 2 tan 2x sec 2x

B. tan 2x sec 2x

C. $-\tan 2x \sec 2x$

D. $-2\tan 2x \sec 2x$

Answer: D

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8. If $y = \log\left(\sqrt{x} + \sqrt{x - a}\right)$, then $\frac{dy}{dx}$ is

A. $\frac{1}{\sqrt{x} + \sqrt{x - a}}$

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

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

D. $\frac{1}{2\left(\sqrt{x}+\sqrt{x-a}\right)}$

Answer: B

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9. $\frac{d}{dx}\left[\log\left(\left(\cos\left(e^{x}\right)\right)\right)\right] =$

A. $\cos\left(e^{x-1}\right)$

B. $e^{-x}\cos\left(e^{x}\right)$

C. $e^{x}\sin\left(e^{x}\right)$

D. $-e^{x}\tan\left(e^{x}\right)$

Answer: D

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10. $\frac{d}{dx}\left[\frac{e^{ax}}{\sin(bx+c)}\right] =$

A. $\frac{e^{ax}[a\sin(bx+c)+b\cos(bx+c)]}{\sin^2(bx+c)}$

B. $\frac{e^{ax}[a\sin(bx+c)-b\cos(bx+c)]}{\sin(bx+c)}$

C. $\frac{e^{ax}[a\sin(bx+c)-b\cos(bx+c)]}{\sin^2(bx+c)}$

D. $\frac{e^{ax}[a\sin(bx+c)+b\cos(bx+c)]}{\sin(bx+c)}$

Answer: C

Watch Video Solution

11. If $y = \sin\left(\sqrt{\sin x + \cos x}\right)$, find $\frac{dy}{dx}$.

A. $\frac{\cos\left(\sqrt{\sin x+\cos x}\right)}{2\sqrt{\sin x+\cos x}}$

B. $\frac{\cos\left(\sqrt{\sin x+\cos x}\right)}{\sqrt{\sin x+\cos x}}$

C. $\frac{\cos\left(\sqrt{\sin x+\cos x}\right)}{2\sqrt{\sin x+\cos x}}.(\cos x-\sin x)$

D. $\cos\left(\sqrt{\sin x+\cos x}\right)$

Answer: C

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12. $\frac{d}{dx}\sqrt{\sec^2 x+\operatorname{cosec}^2 x}=$

A. $4\operatorname{cosec}2x.\cot 2x$

B. -4 cosec 2x.cot 2x

C. -4 cosec x. cot 2x

D. 4 cosec x. cot 2x

Answer: B

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13. If $y = \left(x\cot^3 x\right)^{\frac{3}{2}}$, then $\frac{dy}{dx} =$

A. $\frac{3}{2}\left(x\cot^2 x\right)^{\frac{1}{2}}\left(\cot^3 x - 3x\cot^2 x\operatorname{cosec}^2 x\right)$

B. $\frac{3}{2}\left(x\cot^3 x\right)^{\frac{1}{2}}\left(\cot^2 x - 3x\cot^2 x\operatorname{cosec}^2 x\right)$

C. $\frac{3}{2}\left(x\cot^3 x\right)^{\frac{1}{3}}\left(\cot^3 x - 3x\operatorname{cosec}^2 x\right)$

D. $\frac{3}{2}\left(x\cot^3 x\right)^{\frac{3}{2}}\left(\cot^3 x - 3x\operatorname{cosec}^2 x\right)$

Answer: A

Watch Video Solution

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

Answer: A

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15. If $y=\log\left[\tan\left(\frac{\pi}{4}+\frac{x}{2}\right)\right]$,then $\frac{dy}{dx}$ is

A. $-\tan x$

B. $-\sec x$

C. tan x

D. sec x

Answer: D

Watch Video Solution

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

A. $-\sin x$

B. $-\operatorname{cosec} x$

C. sin x

D. cosec x

Answer: D

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17. $\frac{d}{dx}\left[\log\left\{e^x\left(\frac{x-2}{x+2}\right)^{\frac{3}{4}}\right\}\right] =$

A. 1

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

C. $\frac{x^2-1}{x^2-4}$

D. $e^x\left(\frac{x^2-1}{x^2-4}\right)$

Answer: C

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18. If : $f(x) = \frac{1}{\sqrt{x^2+a^2}+\sqrt{x^2+b^2}}$ then: $f'(x) =$

A. $\frac{x}{a^2-b^2}\left[\frac{1}{\sqrt{x^2+a^2}}-\frac{1}{\sqrt{a^2+b^2}}\right]$

B. $\frac{x}{a^2 + b^2}\left[\frac{1}{\sqrt{x^2}} + a^2 - \frac{2}{\sqrt{a^2 + b^2}}\right]$

C. $\frac{x}{a^2 - b^2}\left[\frac{1}{\sqrt{x^2 + a^2}} + \frac{1}{\sqrt{x^2 + b^2}}\right]$

D. $\left(a^2 + b^2\right)\left[\frac{1}{x^2 + a^2} - \frac{2}{\sqrt{x^2 + b^2}}\right]$

Answer: A

Watch Video Solution

19. $\frac{d}{dx}\left[\log\left(\sqrt{\frac{1 + \sin x}{1 - \sin x}}\right)\right] =$

A. sec x

B. tan x

C. sec 2x

D. tan 2x

Answer: A

Watch Video Solution

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

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

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

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

D. $\frac{2}{\sqrt{x^2 + a^2}}$

Answer: A

Watch Video Solution

21. If $f(x) = \cos\left(\sin x^2\right)$, then $f'(x)$ at $x = \sqrt{\frac{\pi}{2}}$ is

A. -1

B. 1

C. 0

D. 2

Answer: C

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22. If $f(1) = 3$, $f'(1) = 2$, then $\frac{d}{dx}\left\{\log f\left(e^x + 2x\right)\right\}$ at $x = 0$ is equal to.....

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

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

C. 2

D. 0

Answer: C

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DERIVATIVE OF INVERSE FUNCTIONS

1. If $y = \sin^{-1}\left(\frac{19}{20}x\right) + \cos^{-1}\left(\frac{19}{20}x\right)$, then $\frac{dy}{dx} =$

A. 0

B. 1

C. -1

D. 2

Answer: A

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

A. 1

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

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

D. 0

Answer: D

Watch Video Solution

3. If $y = \sec^{-1}\left(\frac{\sqrt{x}+1}{\sqrt{x}-1}\right) + \sin^{-1}\left(\frac{\sqrt{x}-1}{\sqrt{x}+1}\right)$, then $\frac{dy}{dx}$ is equal to?

A. 0

B. 1

C. -1

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

Answer: A

Watch Video Solution

4. $\frac{d}{dx}\left[\sin^{-1}x + \sin^{-1}\sqrt{1-x^2}\right] =$

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

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

C. 0

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

Answer: C

Watch Video Solution

5. $\frac{d}{dx}\left[\sin\left\{2\cos^{-1}(\sin x)\right\}\right]=$

A. $-2\sin 2x$

B. $-2\cos 2x$

C. 2 sin 2x

D. 2 cos 2x

Answer: D

Watch Video Solution

6. Find the differentiation of $y = \tan^{-1}\left(\frac{x^{1/3} + a^{1/3}}{1 - x^{1/3}a^{1/3}}\right)$

A. $\frac{1}{3x^{\frac{2}{3}}\left(1 + x^{\frac{2}{3}}\right)}$

B. $\frac{a}{3x^{\frac{2}{3}}\left(1 + x^{\frac{2}{3}}\right)}$

C. $-\frac{1}{3x^{\frac{2}{3}}\left(1 + x^{\frac{2}{3}}\right)}$

D. $-\frac{a}{3x^{\frac{2}{3}}\left(1 + x^{\frac{2}{3}}\right)}$

Answer: D

Watch Video Solution

7. If $y = \tan^{-1}\left(\frac{6 + 5\tan x}{5 - 6\tan x}\right)$, then $\frac{dy}{dx} =$

A. 1

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

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

D. -1

Answer: A

Watch Video Solution

8. Find $\frac{dy}{dx}$ if $y = \frac{\tan^{-1}(4x)}{1 + 5x^2} + \frac{\tan^{-1}(2 + 3x)}{3 - 2x}$

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

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

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

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

Answer: A

Watch Video Solution

9. Find $\frac{dy}{dx}$ if $y = \frac{\tan^{-1}(4x)}{1+5x^2} + \frac{\tan^{-1}(2+3x)}{3-2x}$

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

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

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

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

Answer: B

Watch Video Solution

10. $\frac{d}{dx}\left(\tan^{-1}\left(\frac{\cos x}{1+\sin x}\right)\right)=$

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

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

C. -1

D. 1

Answer: A

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11. If $y = \tan^{-1}(\sec x - \tan x)$, then $\frac{dy}{dx}$ is equal to

A. 2

B. -2

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

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

Answer: D

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12. Differentiate w.r.t. x:

$(i)\tan^{-1}\left\{\sqrt{\frac{1+\cos x}{1-\cos x}}\right\}$ $(ii)\tan^{-1}\left\{\sqrt{\frac{1+\sin x}{1-\sin x}}\right\}$

A. 0

B. 1

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

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

Answer: C

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13. If $\cot y = \dfrac{\sqrt{1+\sin x}+\sqrt{1-\sin x}}{\sqrt{1+\sin x}-\sqrt{1-\sin x}}$, then $\dfrac{dy}{dx} =$

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

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

C. 3

D. 1

Answer: A

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14. If $y = \sin^{-1}\left(\dfrac{4\cos x + 5\sin x}{\sqrt{41}}\right)$, then $\dfrac{dy}{dx} =$

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

B. 0

C. 1

D. $\frac{1}{\sqrt{41}}$

Answer: C

Watch Video Solution

15. If $y = \tan^{-1}\left(\frac{1+x}{1-x}\right)$ then $\frac{dy}{dx} =$

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

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

C. $\frac{\pi}{4} + \tan^{-1}x$

D. $\tan^{-1}x$

Answer: A

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16. $\frac{d}{dx}\left(\tan^{-1}\left(\frac{2}{x^{-1}-x}\right)\right)$ is equal to

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

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

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

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

Answer: A

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17. $\frac{d}{dx}\left(\tan^{-1}\left(\frac{x}{\sqrt{a^2-x^2}}\right)\right.$

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

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

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

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

Answer: D

Watch Video Solution

18. $\frac{d}{dx}\left(\tan^{-1}\left(\frac{x}{\sqrt{a^2-x^2}}\right)\right.$

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

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

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

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

Answer: D

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19. If `y=sin^(-1)((2x)/(1+x^2))+sec^(-1)((1+x^2)/(1-x^2)),-

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

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

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

D. 0

Answer: A

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20. $\frac{d}{dx}\left[\sin^{-1}\sqrt{\frac{(1-x)}{2}}\right] =$

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

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

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

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

Answer: C

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21. $\tan^{-1}\left(\frac{e^{2x} + 1}{e^{2x} - 1}\right)$

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

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

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

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

Answer: B

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22. $\frac{d}{dx}\left[\sin^{-1}\left(\frac{\sqrt{1+x}+\sqrt{1-x}}{2}\right)\right] =$

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

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

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

D. `1/(x)

Answer: D

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23. The differential coefficient of $\tan^{-1}\left(\frac{\sqrt{1+x}-\sqrt{1-x}}{\sqrt{1+x}+\sqrt{1-x}}\right)$

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

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

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

D. x

Answer: C

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24. $\frac{d}{dx}\left[\sin^2\cot^{-1}\left(\sqrt{\frac{1-x}{1+x}}\right)\right]$ is equal to -

A. -1

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

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

D. 1

Answer: B

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25. If $f(x) = \cot^{-1}\sqrt{\cos 2x}$, then: $f'\left(\frac{\pi}{6}\right) =$

A. $\frac{1}{\sqrt{3}}$

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

C. $\sqrt{\frac{2}{3}}$

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

Answer: C

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

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

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

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

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

Answer: D

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27. If $f(x) = \cos^{-1}\left[\frac{1-(\log x)^2}{1+(\log x)^2}\right]$, then the value of $f'(e)$ is equal to.....

A. 1

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

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

D. $\frac{2}{e^2}$

Answer: B

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LOGARITHMIC DIFFERENTIATION

1. If $y = \left(x^x\right)^x$ then $\frac{dy}{dx}$ is

A. xy(1+ logx)

B. xy(1+ 2 logx)

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

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

Answer: B

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2. If $y = x^{x^2}$, then $\frac{dy}{dx}$ equals

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

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

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

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

Answer: C

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3. $\frac{d}{dx}\left(x^{4x^3}\right)=$

A. x^{12x^2}

B. $4x^{4x^3+2}.(1+3\log x)$

C. $4x^3.\log x$

D. $4x^3(1+3\log x)$

Answer: B

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4. If $y=\sqrt{\frac{1+x}{1-x}}$ then $\frac{dy}{dx}=$?

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

B. $\frac{1}{(1+x)^{\frac{1}{2}}(1-x)^{\frac{3}{2}}}$

C. $\frac{1}{\left(2(1+x)^{\frac{1}{2}}(1-x)^{\frac{3}{2}}\right)}$

D. $\frac{1}{(1+x)^{\frac{3}{2}}(1-x)^{\frac{1}{2}}}$

Answer: B

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5. If $y = \frac{2(x-\sin x)^{\frac{3}{2}}}{\sqrt{x}}$ then $\frac{dy}{dx}$

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6. If $y = \frac{e^x \log x}{x^2}$ then $\frac{dy}{dx}$

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7. $\frac{d}{dx}\left\{(\sin x)^{\log x}\right\}$ is equal to.....

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8. If $y = (\tan x)^{\cot x}$, then $\frac{dy}{dx}$ is equal to.....

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9. If $x^2e^y + 2xye^x + 13 = 0$ then $\frac{dy}{dx} =$

Watch Video Solution

10. If $\sec\left(\frac{x+y}{x-y}\right) = a$, prove that $\frac{dy}{dx} = \frac{y}{x}$.

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

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12. If $\sin(x+y) + \cos(x+y) = 1$, $then \frac{dy}{dx} =$

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13. If $\sin(x+y) = \log(x+y)$ then $\frac{dy}{dx} =$

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14. If $3\sin(xy) + 4\cos(xy) = 5$, $then \frac{dy}{dx} = -\frac{y}{x}$ (b) $\frac{3\sin(xy) + 4\cos(xy)}{3\cos(xy) - 4\sin(xy)}$

$\frac{3\cos(xy) + 4\sin(xy)}{4\cos(xy) - 3\sin(xy)}$ (d) $\frac{\sin^2(a+y)}{\sin a}$

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15. If $x = y\sqrt{1 - y^2}$, then $\frac{dy}{dx} =$

A. 0

B. x

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

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

Answer: C

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16. If $x\sqrt{1 + y} + y\sqrt{1 + x} = 0 x \neq y$ prove that $\frac{dy}{dx} = \frac{-1}{(1 + x)^2}$

A. 1+x

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

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

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

Answer: D

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17. If $y = \sqrt{\log x + \sqrt{\log x + \sqrt{\log x + \infty}}}$, then $\frac{dy}{dx}$ is $\frac{x}{2y - 1}$ (b) $\frac{x}{2y + 1}$ $\frac{1}{x(2y - 1)}$ (d) $\frac{1}{x(1 - 2y)}$

A. $\frac{x}{2y - 1}$

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

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

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

Answer: D

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18. If $y = \sqrt{\sin x + y}$, then $\frac{dy}{dx}$ equals $\frac{\cos x}{2y - 1}$ (b) $\frac{\cos x}{1 - 2y}$ (c) $\frac{\sin x}{1 - 2y}$ (d) $\frac{\sin x}{2y - 1}$

A. $\frac{\sin x}{2y - 1}$

B. $\frac{\cos x}{2y - 1}$

C. $\frac{\sin x}{2y + 1}$

D. $\frac{\cos x}{2y + 1}$

Answer: B

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19. If $y = \sqrt{\cos x + \sqrt{\cos x + \sqrt{\cos x + ...\infty}}}$, then prove that $\frac{dy}{dx} = \frac{\sin x}{1 - 2y}$

A. $\frac{\sin x}{2y - 1}$

B. $\frac{\sin x}{1 - 2y}$

C. $\frac{\sin x}{1 + 2y}$

D. $\frac{\cos x}{1 - 2y}$

Answer: B

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20. If $y = e^{x + e^{x + e^{x + \ldots \text{to} \infty}}}$, then: $\frac{dy}{dx} =$

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

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

C. $\frac{y}{1+y}$

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

Answer: A

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

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

B. $\frac{y^2-x^2}{2y^3-2xy-1}$

C. 2y-1

D. $\frac{x+y^2}{2y^3-2xy-1}$

Answer: B

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22. If $y = x^{x^{x^{x^{\ldots.\infty}}}}$ then prove that $x\frac{dy}{dx} = \frac{y^2}{1 - y\log x}$

A. y

B. $-y$

C. $-y^2$

D. y^2

Answer: D

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23. The derivative of $a^{\sec x}$ w.r.t.$a^{\tan x}(a > 0)$ is

A. $\sec x a^{\sec x - \tan x}$

B. $\sin x a^{\tan x - \sec x}$

C. $\sin x.\, a^{\sec x - \tan x}$

D. $a^{\sec x - \tan x}$

Answer: C

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24. Differentiate $x = e^{\theta}\left(\theta + \frac{1}{\theta}\right), y = e^{-\theta}\left(\theta - \frac{1}{\theta}\right)$

A. $e^{-2\theta}$

B. $\frac{e^{-2\theta}\left(1+\theta^2\right) - \theta^3 + \theta}{\theta^2 - 1 + \theta^3 + \theta}$

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

D. $\frac{e^{-2\theta}\left(1 - \theta^2 - \theta^3 + \theta\right)}{\theta^2 - 1 + \theta^3 + \theta}$

Answer: B

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25. $x = a\left(\cos t + \frac{\log\tan t}{2}\right), y = a\sin t$

A. tan t

B. $-\tan t$

C. cot t

D. $-\cot t$

Answer: A

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

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

Answer: A

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

A. e^x

B. e^t

C. log t

D. 1+ log t

Answer: A

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28. Differentiate $\tan^{-1}\left(\frac{2x}{1-x^2}\right)$ with respect to $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$, if $x \in (1, \infty)$

A. 0

B. -1

C. 1

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

Answer: C

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29. The derivative of $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ w.r.t. $\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ is equal to.....

A. -1

B. 1

C. 2

D. 4

Answer: C

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30. The derivative of $\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ w.r.t. $\cot^{-1}\left(\frac{1-3x^2}{3x-x^2}\right)$ w.r.t. $\sin^{-1}x$ is equal to.....

A. 1

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

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

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

Answer: C

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DERIVATIVE OF PARAMETRIC FUNCTIONS

1. If $y = \left(\sqrt{x}\right)^{\left(\sqrt{x}\right)^{\left(\sqrt{x}\right)^{\cdots\infty}}}$, then, $x\frac{dy}{dx} = \frac{y^2}{p - y\log x}$. Find p

A. 2

B. 1

C. -2

D. Cant say

Answer: A

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2. If $y = (\sin x)^{\sin x} \wedge \left(\left((\sin x)^{\dot{\infty}}\right)\right)$, then $\frac{dy}{dx}$ is equal to.....

A. $\frac{y^2 \cot x}{1 - y \log \sin x}$

B. $\frac{y^2 \cot x}{1 + y \log \sin x}$

C. $\frac{y \cot x}{1 - y \log \sin x}$

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

Answer: A

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3. If $y = x^2 + \dfrac{1}{x^2 + \dfrac{1}{x^2 + \ldots \infty}}$, then $\dfrac{dy}{dx} =$

A. $\dfrac{2xy}{2y - x^2}$

B. $\dfrac{xy}{y + x^2}$

C. $\dfrac{xy}{y - x^2}$

D. $\dfrac{2xy}{2 + \dfrac{x^2}{y}}$

Answer: A

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4. If $y = xe^{xy}$, then $\dfrac{dy}{dx} =$

A. $\dfrac{(1 + xy)y}{(1 - xy)x}$

B. $\dfrac{1 + xy}{1 - xy}$

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

D. $\frac{1 - xy}{1 + xy}$

Answer: A

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5. If $x^y = y^x$,then find $\frac{dy}{dx}$

A. $\frac{y\left(x\log_e y + y\right)}{x\left(y\log_e x + x\right)}$

B. $\frac{y\left(x\log_e y - y\right)}{x\left(y\log_e x - x\right)}$

C. $\frac{x\left(x\log_e y - y\right)}{y\left(y\log_e - x\right)}$

D. $\frac{x\left(x\log_e y + y\right)}{y\left(y\log_e x + x\right)}$

Answer: B

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6. If $x^{y^{.^{x}}} = 1$, $provethat \frac{dy}{dx} = -\left(y\frac{y + x\log y}{x(y\log x + x)}\right.$

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. $-\frac{y}{x}\frac{y + x\log y}{x + y\log x}$

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

Answer: C

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7. If $x^m y^n = 2(x + y)^{m+n}$, the value of $\frac{dy}{dx}$ is

A. x+y

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

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

D. $x - y$

Answer: C

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8. If $x^y = e^{2(x-y)}$, then $\frac{dy}{dx}$ is equal to

A. $\frac{y\log 2}{x\log(2x)}$

B. $\frac{y}{x\log(2x)}$

C. $\frac{x\log 2 - y}{x\log 2x}$

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

Answer: C

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

A. $y^2 \log y$

B. y log y

C. $\frac{y^2}{\log y}$

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

Answer: A

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10. If $\log(x + y) = 2xy$, then $y'(0)$ is

A. 1

B. -1

C. 2

D. 0

Answer: A

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11. Derivative of $e^x \cos x$ w.r.t. $e^{-x} \sin x$ is

A. cot x

B. $-\cot x$

C. e^{2x}

D. $-e^{2x}$

Answer: C

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12. Differential coefficient of $\cos^{-1}\left(\sqrt{x}\right)$ with respect to $\sqrt{(1-x)}$ is equal to.....

A. $\sqrt{x}$

B. $-\sqrt{x}$

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

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

Answer: C

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13. If $x = \frac{e^t + e^{-t}}{2}, y = \frac{e^t - e^{-t}}{2}$, then: $\frac{dy}{dx} =$

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

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

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

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

Answer: A

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14. If $x = a(t\cos t - \sin t), y = a(t\sin t + \cos t), then \frac{dy}{dx} =$

A. $-\tan t$

B. $-\cos t$

C. tan t

D. cos t

Answer: B

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

A. $|\sec\theta|$

B. $\tan\theta$

C. $\tan^2\theta$

D. $\sec^2\theta$

Answer: A

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

A. $\sqrt{\frac{1}{1 + \theta}}$

B. $\frac{1 + \theta}{1 - \theta}$

C. $\sqrt{\frac{1 - \theta}{1 + \theta}}$

D. $\sqrt{\frac{1 + \theta}{1 - \theta}}$

Answer: C

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17. Derivative of $\sin^{-1}x$ w.r.t. $\cos^{-1}\sqrt{1 - x^2}$ is -

A. 1

B. 0

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

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

Answer: A

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18. Differential coefficient of $\sin^{-1}\left(\frac{1-x}{1+x}\right)$ w.r.t $\sqrt{x}$ is

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

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

C. 1

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

Answer: D

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HIGHER ORDER DERIVATIVES

1. If $x = \sin^{-1}\left(3t - 4t^3\right)$ and $y = \cos^{-1}\left(\sqrt{1 - t^2}\right)$, then $\frac{dy}{dx}$ is equal to

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

B. $\frac{2}{5}$

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

D. $\frac{1}{3}$

Answer: D

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2. If $\cos x = \frac{1}{\sqrt{1 + t^2}}$, and $\sin y = \frac{t}{\sqrt{1 + t^2}}$, then $\frac{dy}{dx} =$

A. -1

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

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

D. 1

Answer: D

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3. Differential coefficient of $\tan^{-1}\sqrt{\frac{1-x^2}{1+x^2}}$ w.r.t. $\cos^{-1}\left(x^2\right)$ is equal to.....

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

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

C. 1

D. 0

Answer: A

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

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

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

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

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

Answer: C

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

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

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

C. $\frac{2 - 4x^2}{\sqrt{1 + x^2}}$

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

Answer: A

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6. The derivative of $\tan^{-1}\left[\frac{\sin x}{1 + \cos x}\right]$ with respect to $\tan^{-1}\left[\frac{\cos x}{1 + \sin x}\right]$ is

A. 2

B. -1

C. 0

D. -2

Answer: B

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7. if $x = a\cos^4\theta, y = a\sin^4\theta$, then $\frac{dy}{dx}$ at $\theta = \frac{3\pi}{4}$ is

A. -1

B. 1

C. $-a^2$

D. a^2

Answer: A

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8. The derivative of $\sec^{-1}\left(\frac{1}{2x^2+1}\right)$ with respect to $\sqrt{1+3x}$ at $x = -1/3$ (a) does not exist (b) 0 (c) 1/2 (d) 1/3

A. 0

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

C. $\frac{1}{3}$

D. 1

Answer: A

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9. If $x = \sin t\cos 2t, y = \cos t\sin 2t$, *then* at $t = \frac{\pi}{4}, \frac{dy}{dx}$

A. -2

B. 2

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

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

Answer: C

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10. The derivative 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 $\frac{1}{8}$ (b) $\frac{1}{4}$ (c) $\frac{1}{2}$ (d) 1

A. $\frac{1}{8}$

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

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

D. 1

Answer: B

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11. If : $y = \cos^2\left(\frac{3x}{2}\right) - \sin^2\left(\frac{3x}{2}\right)$, then: $\frac{d^2y}{dx^2} =$

A. $-3\sqrt{1 - y^2}$

B. 9y

C. $-9y$

D. $3\sqrt{1 - y^2}$

Answer: C

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12. If $x = t^2$ and $y = t^3 + 1$, then $\frac{d^2y}{dx^2}$ is

A. $\frac{3}{4t}$

B. $\frac{3t}{4}$

C. $\frac{4}{3t}$

D. $\frac{4t}{3}$

Answer: A

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13. let $y = t^{10} + 1$, and $x = t^8 + 1$, then $\frac{d^2y}{dx^2}$ is

A. $\frac{5}{2}t$

B. $20t^8$

C. $\frac{5}{16t^6}$

D. $\frac{5t^6}{16}$

Answer: C

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14. If $x = \log t, t > 0$ and $y = \frac{1}{t}$, then $\frac{d^2y}{dx^2}$, is

A. $\frac{dy}{dx}$

B. $-\frac{dy}{dx}$

C. y

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

Answer: B

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15. If $y = 1 - x + \frac{x^2}{2!} - \frac{x^3}{3!} + \frac{x^4}{4!} - \ldots,$ then $\frac{d^2y}{dx^2}$ is equal to

A. x

B. $-x$

C. $-y$

D. y

Answer: D

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16. Let f be a function defined for every x, such that $f' = -f$, f(0)=0,f'(0) =1 then f(x) is equal to

A. tan x

B. $e^x - 1$

C. sin x

D. 2 sin x

Answer: C

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17. If $e^y (x + 1) = 1$, then $\frac{d^2y}{dx^2} =$.

A. 0

B. 1

C. $\frac{dy}{dx}$

D. $\left(\frac{dy}{dx}\right)^2$

Answer: D

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18. If $y = ax^5 + \frac{b}{x^4}$, then $\frac{d^2y}{dx^2} =$

A. $-20x^2y$

B. $20x^2y$

C. $\frac{20y}{x^2}$

D. $\frac{40x^5}{y^3}$

Answer: C

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19. If $y = ax^{n+1} + bx^{-n}$, $then x^2\frac{d^2y}{dx^2}$ is equal to

A. n(n-1)y

B. n(n+1)y

C. ny

D. n^2y

Answer: B

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20. If $y = a\cos(\log x) + b\sin(\log x)$ *where* a, b *are* parameters ,then $x^2y'' + xy' =$

A. y

B. $-y$

C. 2y-1

D. $-2y$

Answer: B

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21. If $y = a^x b^{2x-1}$, *then* $\frac{d^2y}{dx^2} =$

A. $y^2 \log ab^2$

B. $y.\ \log ab^2$

C. y^2

D. $y\left(\log ab^2\right)^2$

Answer: D

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22. If $y = \log\left(x + \sqrt{x^2 + a^2}\right)$, then $\frac{d^2y}{dx^2}$, is equal to

A. $\frac{1}{\left(x^2 + a^2\right)^{\frac{3}{2}}}$

B. $\frac{x}{\left(x^2+a^2\right)^{\frac{3}{2}}}$

C. $-\frac{1}{\left(x^2+a^2\right)^{\frac{3}{2}}}$

D. $-\frac{x}{\left(x^2+a^2\right)^{\frac{3}{2}}}$

Answer: D

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23. If $y = x^2 + 2x + 3$, then $\frac{d^2x}{dy^2}$

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

B. $-\frac{1}{4(x+1)^3}$

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

D. $\frac{1}{8(x+1)^4}$

Answer: B

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24. If $y = x + e^x$, then $\frac{d^2x}{dy^2}$ is equal to

A. e^x

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

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

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

Answer: B

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25. If $y = \sin x + e^x$, then $\frac{d^2x}{dy^2} =$

A. $\left(-\sin x + e^x\right)^{-1}$

B. $\frac{\sin x - e^x}{\left(\cos x + e^x\right)^2}$

C. $\frac{\sin x - e^x}{\left(\cos x + e^x\right)^3}$

D. $\frac{\sin x + e^x}{\left(\cos x + e^x\right)^3}$

Answer: C

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26. 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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27. $\frac{d^2}{dx^2(2\cos x\cos 3x)}$ is equal to

A. $2^2\left(\cos 2x + 2^2\cos 4x\right)$

B. $2^2\left(\cos 2x - 2^2\cos 4x\right)$

C. $2^2\left(-\cos 2x + 2^2\cos 4x\right)$

D. $-2^2\left(\cos 2x + 2^2\cos 4x\right)$

Answer: D

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28. $\frac{d^2x}{dy^2} =$

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

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

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

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

Answer: D

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29. If $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, then $\frac{d^2y}{dx^2}$ is

A. $-\frac{b^4}{a^2y^3}$

B. $-\frac{b^4}{y^3}$

C. $-\frac{b^4}{a^2}$

D. $\frac{b^4}{a^2}$

Answer: A

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30. If $x = f(t)$ and $y = g(t)$, then $\frac{d^2y}{dx^2}$ is equal to

A. $\frac{g''(t)f'(t) - g'(t)f''(t)}{[f'(t)]^2}$

B. $\frac{g''(t)f'(t) - g'(t)f''(t)}{[f'(t)]^3}$

C. $\frac{g''(t)}{g''(t)}$

D. $\frac{f''(t)}{g''(t)}$

Answer: B

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31. If $y = \frac{\cos x - \sin x}{\cos x + \sin x}$, then $\frac{\frac{d^2y}{dx^2}}{\frac{dy}{dx}}$

A. y

B. $-2y$

C. 3y

D. $-4y$

Answer: B

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32. If $y = \cos(\log x)$, then $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} + y$ is equal to

A. 0

B. 1

C. 2

D. 3

Answer: A

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COMPETITIVE THINKING

1. If $f(x) = \begin{cases} 1 & x < 0 \\ 1 + \sin x & 0 \leq x < \frac{\pi}{2} \end{cases}$ then derivative of f(x) x=0

A. 1

B. 0

C. ∞

D. does not exist

Answer: D

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2. If $f: R \to R$ is defined by $f(x) = \begin{cases} \frac{x-2}{x^2-3x+2} & \text{if } x \in R - (1, 2) \\ 2 & \text{if } x = 1 \\ 1 & \text{if } x = 2 \end{cases}$

them $\lim_{x \to 2} \frac{f(x) - f(2)}{x - 2} =$

A. 0

B. -1

C. 1

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

Answer: B

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3. If $f(x) = \begin{cases} \frac{x-1}{2x^2-7x+5} & \text{for } x \neq 1 \\ -\frac{1}{3} & \text{for } x = 1 \end{cases}$ then f (1) is equal to

A. $-\frac{1}{9}$

B. $-\frac{2}{9}$

C. $-\frac{1}{3}$

D. $\frac{1}{3}$

Answer: B

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4. If $f(x)=\begin{cases} \frac{x\log\cos x}{\log\left(1+x^2\right)} & x \neq 0 \\ 0 & x = 0 \end{cases}$ then

A. discontinous at zero

B. continous but not differentiable at zero

C. differentiable at zero

D. not continous and not differentiable at zero

Answer: C

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5. For the function $f(x)=\begin{cases} |x-3| & x \geq 1 \\ \frac{x^2}{4}-\frac{3x}{2}+\frac{13}{4} & x < 1 \end{cases}$ which one of the

folllowing is incorrect

A. not continous at x=1

B. not derivable at x=1

C. continous and derivable at x=1

D. continous at x=1 but not derivable at x=1

Answer: C

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6. If $f(x) = x$ for $x \leq 0 = 0$ for $x > 0$, then $f(x)$ at $x = 0$ is

A. Continuous but not dIfferentiable

B. Not continuous but dIfferentiable

C. Continuous and dIfferentiable

D. Not continuous are not dIfferentiable

Answer: A

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7. At the point x = 1 , then function

$$f(x) = \begin{cases} x^3 - 1 & 1 < x < \infty \\ x - 1 & 1 - \infty < x \leq 1 \end{cases}$$ is

A. Continuous but not dIfferentiable

B. Not continuous but dIfferentiable

C. Discontinuous and dIfferentiable

D. Discontinuous are not dIfferentiable

Answer: B

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8. Define $f(x) = \begin{cases} x^2 + bx + c & , \quad x < 1 \\ x & , \quad x \geq 1 \end{cases}$. If f(x) is differentiable at x = 1, then (b - c) =

A. -2

B. 0

C. 1

D. 2

Answer: A

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9. If f is differentiable at x=1, Then $\lim_{x \to 1} \frac{x^2 f(1) - f(x)}{x - 1}$ is

A. $-f'(1)$

B. $f(1) - f'(1)$

C. $2f(1) - f'(1)$

D. $2f(1) + f'(1)$

Answer: C

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10. if $f(2) = 4, f'(2) = 1$ then $\lim_{x \to 2} \frac{xf(2) - 2f(x)}{x - 2}$

A. 1

B. 2

C. 3

D. -2

Answer: B

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11. If f(x) is differentiable at x=a, then $\lim_{x \to a} \frac{x^2 f(a) - a^2 f(x)}{x - a}$ is equal to

A. $a^2 f(a) - 2af'(a)$

B. $2af(a) + a^2 f'(a)$

C. $2af(a) - a^2 f'(a)$

D. None of these

Answer: C

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12. Suppose $f(x)$ is differentiable at $x = 1$ and $\lim_{h \to 0} \frac{1}{h} f(1 + h) = 5$, then $f'(1)$ equal

A. 0

B. 1

C. 3

D. 5

Answer: D

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13. Let $f: R \to R$ be a function defined by $f(x) = \max . \left\{x, x^3\right\}$. The set of all points where $f(x)$ is NOT differenctiable is

(a) $\{-1, 1\}$

(b) $\{-1, 0\}$

(c) $\{0, 1\}$

(d) $\{-1, 0, 1\}$

A. {-1,1}

B. {-1,0}

C. {0,1}

D. {-1,0,1}

Answer: D

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14. Let $g(x) = \frac{(x - 1)^n}{\log\left(\cos^m(x - 1)\right)}; 0 < x < 2$,m and n and let p be the left hand derivative of $|x - 1|$ at $x = 1$. If $\lim_{x \to 1} g(x) = p$, then (A) $n = 1, m = 1$ (B) $n = 1, m = -1$ (C) $n = 2, m = 2$ (D) $n > 2, m = n$

A. n=1,m=1

B. n=1,m=-1

C. n=2,m=2

D. $n > 2, m = n$

Answer: C

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15. Let $f(x) = \left\{ x^2 \left| (\cos)\frac{\pi}{x} \right|, x \neq 0 \text{ and } 0, x = 0, x \in \mathbb{R}, \text{ then } f \text{ is} \right.$

A. dIfferentiable both are x=0 and x=2

B. dIfferentiable at x=0 but not dIfferentiable at x=2

C. not dIfferentiable at x=2 but dIfferentiable at x=2

D. dIfferentiable neither at x=2 nor at x=2

Answer: B

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16. If the function

$$g(x) = \begin{cases} k\sqrt{x+1} & \text{when } 0 \le x \le 3 \\ mx + 2 & \text{when } 3 < x \le 5 \end{cases}$$

is differentiable, then the value of (k+m) is -

A. 2

B. $\frac{16}{5}$

C. $\frac{10}{3}$

D. 4

Answer: A

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17. Let $S = \left\{t \in R : f(x) = |x - \pi|\left(e^{|x|} - 1\right)\sin|x| \text{ is not differentiable at t}\right\}$ Then the set S is equal to: (1) ϕ (2) {0} (3) $\{\pi\}$ (4) $\{0, \pi\}$

A. $\{0\}$

B. $\{\pi\}$

C. $\{0, \pi\}$

D. $\phi(anemptyset)$

Answer: D

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18. $If y = \cos\left(2x + 45^\circ\right), then \frac{dy}{dx} =$

A. $-\frac{\pi}{90}\sin(2x + 45)$

B. $2\sin(2x + 45)$

C. $\frac{\pi}{90}\sin(2x + 45)$

D. $-2\sin(2x + 45)$

Answer: D

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19. If $y = \sqrt{\sin\sqrt{x}}$, then $\frac{dy}{dx} =$

A. $\frac{\cos\sqrt{x}}{4\sqrt{x}\sqrt{\sin\sqrt{x}}}$

B. $\frac{\sin\sqrt{x}}{4\sqrt{x}\cos\sqrt{x}}$

C. $\frac{\sqrt{\sin\sqrt{x}}}{2\sqrt{x}}$

D. $\frac{\sqrt{\cos\sqrt{x}}}{2\sqrt{x}}$

Answer: A

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20. $\frac{d}{dx}\log_{|x|}e =$

A. e^x

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

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

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

Answer: C

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21. The differential coefficient of $f\left(\log_e x\right) w.r.t.\, x,$ where $f(x) = \log_e x,$ is (i) $\frac{x}{\ln x}$ (ii) $\frac{\ln x}{x}$ (iii) $\frac{1}{x\ln x}$ (iv) $x\ln x$

A. x log x

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

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

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

Answer: C

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22. If $y = \log_2\left(\log_2 x\right)$, then $\frac{dy}{dx}=$

A. $\frac{\log_e 2}{x\log_e x}$

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

C. $\frac{1}{\left(x\log_e x\right)\log_e 2}$

D. $\frac{1}{x\left(\log_2 x\right)^2}$

Answer: C

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23. If $y = \log\left(\frac{1 - x^2}{1 + x^2}\right)$, then $\frac{dy}{dx} =$

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

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

C. $\frac{-4x^3}{1 - x^4}$

D. $\frac{4x^3}{1 - x^4}$

Answer: B

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24. $\frac{d}{dx}\left[\cos\left(1 - x^2\right)^2\right] =$

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

B. $-4x\left(1-x^2\right)\sin\left(1-x^2\right)^2$

C. $4x\left(1-x^2\right)\sin\left(1-x^2\right)^2$

D. $-2\left(1-x^2\right)\sin\left(1-x^2\right)^2$

Answer: C

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25. $\frac{d}{dx}\left[e^x\log\left(1+x^2\right)\right]=$

A. $e^x\left[\log\left(1+x^2\right)+\frac{2x}{1+x^2}\right]$

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

C. $e^x\left[\log\left(1+x^2\right)+\frac{x}{1+x^2}\right]$

D. $e^x\left[\log\left(1+x^2\right)-\frac{x}{1+x^2}\right]$

Answer: A

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26. $\frac{d}{dx}\left(e^{x}\log\sin 2x\right) =$

A. $e^{x}(\log\sin 2x + 2\cot 2x)$

B. $e^{x}(\log\cos 2x + 2\cot 2x)$

C. $e^{x}(\log\cos 2x + \cot 2x)$

D. None of these

Answer: A

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27. $\frac{d}{dx}\left(e^{\sqrt{1-x^{2}}}.\tan x\right) =$

A. $e^{\sqrt{1-x^2}}\left[\sec^2 x + \frac{x\tan x}{\sqrt{1-x^2}}\right]$

B. $e^{\sqrt{1-x^2}}\left[\sec^2 x - \frac{x\tan x}{\sqrt{1-x^2}}\right]$

C. $e^{\sqrt{1-x^2}}\left[\sec^2 x + \frac{\tan x}{\sqrt{1-x^2}}\right]$

D. None of these

Answer: B

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28. Find the differentiation of $\frac{e^{2x}+e^{-2x}}{e^{2x}-e^{-2x}}$ w.r.t. x

A. $\frac{-8}{\left(e^{2x}-e^{-2x}\right)^2}$

B. $\frac{8}{\left(e^{2x}-e^{-2x}\right)^2}$

C. $\frac{-4}{\left(e^{2x}-e^{-2x}\right)^2}$

D. $\frac{4}{\left(e^{2x}-e^{-2x}\right)^2}$

Answer: A

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29. if $y=\log x\cdot e^{\left(\tan x+x^2\right)}$, then $\frac{dy}{dx}$ is equal to

A. $e^{\left(\tan x+x^2\right)}\left[\frac{1}{x}+\left(\sec^2 x+x\right)\log x\right]$

B. $e^{\left(\tan x+x^2\right)}\left[\frac{1}{x}+\left(\sec^2 x-x\right)\log x\right]$

C. $e^{\left(\tan x+x^2\right)}\left[\frac{1}{x}+\left(\sec^2 x-x\right)\log x\right]$

D. $e^{\left(\tan x+x^2\right)}\left[\frac{1}{x}+\left(\sec^2 x-2x\right)\log x\right]$

Answer: C

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30. Let $F(x) = e^x, G(x) = e^{-x}$ and $H(x) = G(F(x))$, where x is a real variable. Then $\frac{dH}{dx}$ at x=0 is

A. 1

B. -1

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

D. $-e$

Answer: C

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31. let $f(x) = e^x, g(x) = \sin^{-1}x$ and $h(x) = f(g(x))$ then find $\frac{h'(x)}{h(x)}$

A. $e^{\sin^{-1}x}$

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

C. $\sin^{-1}x$

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

Answer: B

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32. If $f(x) = \frac{1}{1-x}$, then the derivative of the composite function f[f{f(x)}]` is equal to

A. 0

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

C. 1

D. 2

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 $\frac{dy}{dx}$ is equal to

A. $\frac{6x^2 - 2x + 2}{\left(x^2 + 1\right)^2} \sin\left(\frac{2x - 1}{x^2 + 1}\right)^2$

B. $\frac{6x^2 - 2x + 2}{\left(x^2 + 1\right)^2} \sin\left(\frac{2x - 1}{x^2 + 1}\right)$

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

D. $\frac{-2x^2 + 2x + 2}{\left(x^2 + 1\right)^2} \sin\left(\frac{2x - 1}{x^2 + 1}\right)^2$

Answer: D

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34. If g(x) is the inverse function of f(x) and $f'(x) = \frac{1}{1+x^4}$, then $g'(x)$ is

A. $1 + [g(x)]^4$

B. $1 - [g(x)]^4$

C. $1 + [f(x)]^4$

D. $\frac{1}{1+[g(x)]^4}$

Answer: A

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35. Let f : (-1,1) → R be a differentiabale function with f(0) = -1 and f'(0) = 1. Let

g(x) = $[f(2f(x) + 2)]^2$, then g'(0)=

A. 0

B. -2

C. 4

D. -4

Answer: D

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36. given $y = \frac{5x}{3 \cdot \sqrt{1 - x^2}} + \cos^2(2x + 1)$, find $\frac{dy}{dx}$

A. $\frac{5(3 - x)}{3(1 - x)^{\frac{5}{3}}} - 2\sin(4x + 2)$

B. $\frac{5(3 - x)}{3(1 - x)^{\frac{2}{3}}} - 2\sin(4x + 4)$

C. $\frac{5(3 - x)}{3(1 - x)^{\frac{2}{3}}} - 2\sin(2x + 1)$

D. None of these

Answer: A

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37. If $y = f\left(x^2 + 2\right)$ and $f'(3) = 5$, then $\frac{dy}{dx}$ at x $= 1$ is

A. 15

B. 5

C. 10

D. 25

Answer: C

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

A. e

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

C. 1

D. None of these

Answer: B

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39. If $f(x) = \sqrt{1 + \cos^2\left(x^2\right)}$, then $f'\left(\frac{\sqrt{\pi}}{2}\right)$ is

A. $\frac{\sqrt{\pi}}{6}$

B. $-\sqrt{\frac{\pi}{6}}$

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

D. $\frac{\pi}{\sqrt{6}}$

Answer: B

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40. If : $f(x) = \frac{\sin^2 x}{1 + \cot x} + \frac{\cos^2 x}{1 + \tan x}$, then: $f'\left(\frac{\pi}{4}\right) =$

A. $\sqrt{3}$

B. $\frac{1}{\sqrt{3}}$

C. 0

D. $-\sqrt{3}$

Answer: C

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41. $\frac{d}{dx}\tan^{-1}\left(\frac{1-x}{1+x}\right) =$

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

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

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

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

Answer: B

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42. If $y = \tan^{-1}\left(\frac{\sqrt{a}-\sqrt{x}}{1+\sqrt{ax}}\right)$, $then \frac{dy}{dx} =$

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

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

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

D. None of these

Answer: C

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43. If $y = \tan^{-1}\left[\frac{\sin x - \cos x}{\cos x - \sin x}\right]$ then $\frac{dy}{dx}$ is

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

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

C. 0

D. 1

Answer: D

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

A. 2

B. -1

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

D. 0

Answer: B

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45. यदि $y = \text{sectan}^{-1}x$, तब $\frac{dy}{dx} =$

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

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

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

D. None of these

Answer: A

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46. the derivative of $\frac{\tan^{-1}\left(6x\sqrt{x}\right)}{1 - 9x^3}$ is $\sqrt{x}g(x)$ then $g(x)$ is:

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

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

C. $\frac{3x\sqrt{x}}{1 - 9x^2}$

D. $\frac{3x}{1 - 9x^2}$

Answer: B

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47. If $y = e^{m\sin^{-1}x}$ and $\left(1 - x^2\right)\left(\frac{dy}{dx}\right)^2 = Ay^2$. then A =

A. m

B. $-m$

C. m^2

D. $-m^2$

Answer: C

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48. If $y = \sin^{-1}\left[x(1 - x) - \sqrt{x}\sqrt{1 - x^2}\right]$, find $\frac{dy}{dx}$,

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

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

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

D. None of these

Answer: C

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49. Find $\frac{dy}{dx}$ when $\left(y-\tan^{-1}\right)\frac{x}{1+\sqrt{1-x^2}}+\sin\left[2\tan^{-1}\sqrt{\frac{1-x}{1+x}}\right]$?

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

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

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

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

Answer: D

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50. 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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51. What is the derivative of $\tan^{-1}\left(\frac{\sqrt{x} - x}{1 + x^{3/2}}\right)$ at x = 1?

A. 0

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

C. -1

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

Answer: D

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52. If $y = \left(\tan^{-1}\right)\frac{\sqrt{1 + x^2} - 1}{x}$, then $y'(1)$ is equal to

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

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

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

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

Answer: A

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53. If $y = \left(1 + \frac{1}{x}\right)^x$, $then \frac{dy}{dx} =$

A. $\left(1 + \frac{1}{x}\right)^x \left[\log\left(1 + \frac{1}{x}\right) - \frac{1}{1+x}\right]$

B. $\left(1 + \frac{1}{x}\right)^x \left[\log\left(1 + \frac{1}{x}\right)\right]$

C. $\left(x + \frac{1}{x}\right)^x \left[\log(x-1) - \frac{x}{x-1}\right]$

D. $\left(1 + \frac{1}{x}\right)^x \left[\left(1 + \frac{1}{x}\right) + \frac{1}{1+x}\right]$

Answer: A

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54. If $y = (\sin x)^{\tan x}$, $then \frac{dy}{dx}$ is equal to

A. $(\sin x)^{\tan x}. \left[1 + \sec^2 x. \log(\sin x)\right]$

B. $\tan x. (\sin x)^{\tan x - 1}. \cos x$

C. $(\sin x)^{\tan x}. \sec^2. x. \log(\sin x)$

D. $\tan x. (\sin x)^{\tan x - 1}$

Answer: A

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55. If $y = \frac{e^{2x}\cos x}{x\sin x}$, $then \frac{dy}{dx} =$

A. $\frac{e^{2x}\left[(2x - 1)\cot x - x\operatorname{cosec}^2 x\right]}{x^2}$

B. $\frac{e^{2x}\left[(2x+1)\cot x - x\operatorname{cosec}^2 x\right]}{x^2}$

C. $\frac{e^{2x}\left[(2x-1)\cot x + x\operatorname{cosec}^2 x\right]}{x^2}$

D. None of these

Answer: A

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56. If $y = \{f(x)\}^{\phi(x)}$, then $\frac{dy}{dx}$ is

A. $e^{\phi \log f}\left\{\frac{\phi}{f}.\frac{df}{dx} + \log f.\frac{d\phi}{dx}\right\}$

B. $\frac{\phi}{f}\left(\frac{df}{dx}\right) + \frac{d\phi}{dx}\log f$

C. $e^{\phi \log f}\left\{\phi\frac{f'}{f} + \phi' \log f'\right\}$

D. None of these

Answer: A

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

A. $(x\log x)^{\log(\log x)}\left\{\frac{1}{x\log x}[\log x + \log(\log x)] + \log(\log x)\left(\frac{1}{x} + \frac{1}{x\log x}\right)\right\}$

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

C. $(x\log x)^{x\log x}\frac{\log(\log x)}{2}\left[\frac{1}{\log x} + 1\right]$

D. None of these

Answer: A

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58. If $y = \left[(\tan x)^{\tan x}\right]^{\tan x}$, then at $x = \frac{\pi}{4}$, the value of $\frac{dy}{dx} =$

A. 0

B. 1

C. 2

D. None of these

Answer: C

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59. If $y = 1 + xe^y$, $then \frac{dy}{dx} =$

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

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

C. $\frac{e^y}{y - 2}$

D. $\frac{e^y}{2 - y}$

Answer: D

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60. If $xy = 1 + \log y$ and $k\frac{dy}{dx} + y^2 = 0$, then k is

A. $1 + xy$

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

C. $xy - 1$

D. $1 - 2xy$

Answer: C

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

A. xy

B. $-xy$

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

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

Answer: C

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62. If $y=e^{\sin^{-1}\left(t^2-1\right)}$ and $x=e^{\sec^{-1}\left(\frac{1}{t^2-1}\right)}$, $then\frac{dy}{dx}$ is

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

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

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

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

Answer: A

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63. if $2x^2 - 3xy + y^2 + x + 2y - 8 = 0$ then $\frac{dy}{dx}$

A. $\frac{3y - 4x - 1}{2y - 3x + 2}$

B. $\frac{3y + 4x + 1}{2y + 3x + 2}$

C. $\frac{3y - 4x - 1}{2y - 3x - 2}$

D. $\frac{3y - 4x + 1}{2y + 3x + 2}$

Answer: A

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64. If $y\sec x + \tan x + x^2 y = 0$, then $\frac{dy}{dx}$ =

A. $\frac{2xy + \sec^2 x + y\sec x \tan x}{x^2 + \sec x}$

B. $-\frac{2xy + \sec^2 x + \sec x \tan x}{x^2 + \sec x}$

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

D. None of these

Answer: C

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65. If $y = \sqrt{x + \sqrt{x + \sqrt{x \ldots \text{ to } \infty}}}$, then $\frac{dy}{dx}$ =

A. $\frac{1}{y^2 - 1}$

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

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

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

Answer: D

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

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

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

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

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

Answer: D

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67. If $x^p y^q = (x+y)^{(p+q)}$ then $\frac{dy}{dx} = ?$

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

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

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

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

Answer: A

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68. If $y^y = x\sin y$, then $\frac{dy}{dx} =$

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

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

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

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

Answer: D

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69. If $\log_{10}\left(\frac{x^2-y^2}{x^2+y^2}\right)=2$, *then* $\frac{dy}{dx}=$

A. $-\frac{99x}{101y}$

B. $\frac{99x}{101y}$

C. $-\frac{99y}{101x}$

D. $\frac{99y}{101x}$

Answer: A

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70. IF $\log_{10}\left(\frac{x^3 - y^3}{x^3 + y^3}\right) = 2$ then $\frac{dy}{dx} =$

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

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

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

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

Answer: D

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71. $\cos^{-1}\left(\frac{x^2 - y^2}{x^2 + y^2}\right) = \log a$ find $\frac{dy}{dx}$

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

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

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

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

Answer: A

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72. If $\sin y = x\sin(a+y)$, prove that $\frac{dy}{dx} = \frac{\sin^2(a+y)}{\sin a}$

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

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

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

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

Answer: C

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73. If $\cos y = x\cos(a + y)$, with $\cos a \neq \pm 1$, prove that $\frac{dy}{dx} = \frac{\cos^2(a + y)}{\sin a}$.

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

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

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

D. $\frac{\cos^2(a + y)}{\cos a}$

Answer: B

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74. If $\sin(xy) + \frac{x}{y} = x^2 - y$, then $\frac{dy}{dx}$ is equal to

A. $\frac{y\left[2xy - y^2\cos(xy) - 1\right]}{xy^2\cos(xy) + y^2 - x}$

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

C. $\frac{y\left[2xy - y^2\cos(xy) - 1\right]}{xy^2\cos(xy) + y^2 - x}$

D. None of these

Answer: A

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

A. 0

B. 1

C. 2

D. None of these

Answer: A

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

A. -1

B. -2

C. 1

D. 2

Answer: C

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77. if $2^x + 2^y = 2^{x+y}$ then the value of $\frac{dy}{dx}$ at $x = y = 1$

A. 0

B. -1

C. 1

D. 2

Answer: B

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78. If $\sin y + e^{-x\cos y} = e$, then $\frac{dy}{dx}$ at $(1, \pi)$, is

A. siny

B. $-x\cos y$

C. e

D. siny-x cos y

Answer: C

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79. Let y be an implicit function of x defined by $x^{2x} - 2x^x \cot y - 1 = 0$. Then $y'(1)$ equals: 1 b. $\log 2$ c. $-\log 2$ d. -1

A. -1

B. 1

C. log 2

D. $-\log 2$

Answer: A

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80. The dIfferential coefficient of x^6 with respect to x^3 is

A. $5x^2$

B. $3x^3$

C. $5x^5$

D. $2x^3$

Answer: D

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81. Darivative of sin x w.r.t. cos x is

A. $-\cot x$

B. tan x

C. $-\tan x$

D. cot x

Answer: A

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82. The derivative of $\sin^2 x$ with respect to $\cos^2 x$ is equal to....

A. $\tan^2 x$

B. tan x

C. $-\tan x$

D. None of these

Answer: D

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83. The derivative of $\cos^3 x$ w.r.t. $\sin^3 x$ is

A. $-\cot x$

B. $\tan x$

C. cot x

D. $\sec x$

Answer: A

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84. The derivative of $\log_{10x}$ with respect to x^2, is

A. $\frac{1}{2x^2}\log_e 10$

B. $\frac{2}{x^2}\log_{10} e$

C. $\frac{1}{2x^2}\log_{10} e$

D. None of these

Answer: C

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85. The dIfferential coefficient of $\log_{10}x$ with respect to $\log_x 10$ is

A. $-\left(\log_{10}x\right)^2$

B. $\frac{x^2}{100}$

C. 1

D. $\left(\log_e 10\right)^2$

Answer: A

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

A. $\sec^2\theta$

B. $\tan\theta$

C. 1

D. $\tan^2\theta$

Answer: A

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

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

B. e^x

C. $e^x - 1$

D. $x - y$

Answer: A

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88. If $x = a(t - \sin t), y = a(1 - \cos t)$, then $\frac{dy}{dx}$ is equal to

A. $\tan\left(\frac{t}{2}\right)$

B. $-\tan\left(\frac{t}{2}\right)$

C. $\cot\left(\frac{t}{2}\right)$

D. $-\cot\left(\frac{t}{2}\right)$

Answer: C

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89. If $x = 2\cos\theta - \cos 2\theta$ and $y = 2\sin\theta - \sin 2\theta$, then $\frac{dy}{dx} =$

A. $-\tan\left(\frac{3\theta}{2}\right)$

B. $\cot\left(\frac{\theta}{2}\right)$

C. $\tan\left(\frac{3\theta}{2}\right)$

D. $\cot\left(\frac{2\theta}{3}\right)$

Answer: C

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90. If $\sin x = \frac{2t}{1+t^2}$, $\tan y = \frac{2t}{1-t^2}$, find $\frac{dy}{dx}$.

A. 1

B. 0

C. -1

D. 2

Answer: A

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91. Daribative of $(\log x)^x w.\ r.\ t \log x$ is

A. $x^2(\log x)^x\left[\log(\log x)+\frac{1}{\log x}\right]$

B. $x(\log x)^x\left[\log(\log x)+\frac{1}{\log x}\right]$

C. $x^3(\log x)^x\left[\log(\log x)+\frac{1}{\log x}\right]$

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

Answer: B

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92. DIfferential coefficient of $\tan^{-1}\left(\frac{x}{1+\sqrt{1-x^2}}\right)w.r.t\sin^{-1}x$ is

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

B. 1

C. 2

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

Answer: A

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

A. 2

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

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

D. $1-x^2$

Answer: A

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94. The differential coefficient of $\tan^{-1}\left(\frac{\sqrt{1+x^2}-1}{x}\right)$ with respect to $\tan^{-1}x$ is equal to.....

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

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

C. 1

D. None of these

Answer: A

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95. Find the differential coefficient of $\sin^{-1}\left(2x\sqrt{1-x^2}\right) w.r.t. \sin^{-1}\left(3x-4x^3\right)$.

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

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

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

D. 1

Answer: A

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96. Derivative of $\tan^{-1}\left(\frac{x}{\sqrt{1-x^2}}\right)$ with respect to $\sin^{-1}\left(3x-4x^3\right)$ is

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

B. $\frac{3}{\sqrt{1-x^2}}$

C. 3

D. $\frac{1}{3}$

Answer: D

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97. The derivative of $f(x)=x^{\tan^{-1}x}$ with respect to $g(x)=\sec^{-1}\left(\frac{1}{2x^2-1}\right)$ is

A. $\frac{1}{2}\sqrt{1-x}x^{\tan^{-1}x}\left[\frac{\log x}{1+x^2}+\frac{\tan^{-1}x}{x}\right]$

B. $-\frac{1}{2}\sqrt{1-x^2}x^{\tan^{-1}x}\left[\log\left(\tan^{-1}x\right)+x\left(1+x^2\right)\tan^{-1}x\right]$

C. $\frac{-2\tan^{-1}x\left[\frac{\log x}{1+x^2}+\frac{\tan^{-1}x}{x}\right]}{\sqrt{1-x^2}}$

D. $-\frac{1}{2}\sqrt{1-x^2}x^{\tan^{-1}x}\left[\frac{\log_x}{1+x^2}+\frac{\tan^{-1}x}{x}\right]$

Answer: D

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98. If $x = ct$ and $y = \frac{c}{t}$, find $\frac{dy}{dx}$ at t=2.

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

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

C. 0

D. 4

Answer: A

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99. If $y = a\sin^3\theta$ and $x = a\cos^3\theta$. then at $\theta = \frac{\pi}{3}$, $\frac{dy}{dx}$ is equal to

A. $-\frac{1}{\sqrt{3}}$

B. $-\sqrt{3}$

C. $\frac{1}{\sqrt{3}}$

D. $\sqrt{3}$

Answer: B

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100. If $x = e^{\theta}(\sin\theta - \cos\theta), y = e^{\theta}(\sin\theta + \cos\theta)$ then $\frac{dy}{dx}$ at $\theta = \frac{\pi}{4}$ is

A. 1

B. 0

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

D. $\sqrt{2}$

Answer: A

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101. Derivative of $\log(\sec\theta + \tan\theta)$ with respect to $\sec\theta$ at $\theta = \frac{\pi}{4}$ is

A. 0

B. 1

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

D. $\sqrt{2}$

Answer: B

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102. The differential coefficient of $\sec^{-1}\left(\frac{1}{2x^2 - 1}\right)$ w.r.t $\sqrt{1 - x^2}$ is

A. 2

B. 4

C. 6

D. 1

Answer: B

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103. Find the derivative of $f(\tan x)$ w.r.t. $g(\sec x)$ at $x = \frac{\pi}{4}$, where $f'(1) = 2$ and $g'\left(\sqrt{2}\right) = 4$.

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

B. $\sqrt{2}$

C. 1

D. 0

Answer: A

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104. If y=A sin 5x, then $\frac{d^2y}{dx^2}$=

A. $-25y$

B. 25y

C. 5y

D. $-5y$

Answer: A

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105. If $a = A\cos 4t + B\sin 4t$, then $\frac{d^2x}{dt^2}$ is equal to

A. x

B. $-16x$

C. 15x

D. 16x

Answer: B

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106. If $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ then, $\frac{d^2y}{dx^2} =$

A. $\frac{-b^4}{a^2y^3}$

B. $\frac{b^2}{ay^2}$

C. $\frac{-b^3}{a^2y^3}$

D. $\frac{b^2}{a^2y^2}$

Answer: A

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107. If $y = \log(\log x)$ then $\frac{d^2y}{dx^2}$ is equal to

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

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

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

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

Answer: A

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108. The second order derivative of $\frac{e^x+1}{e^x}$ is

A. e^x

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

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

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

Answer: B

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

A. 4

B. 2

C. 1

D. 0

Answer: B

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110. If $y = \left(\sin^{-1}x\right)^2$, show that $\left(1-x^2\right)\frac{d^2y}{dx^2} - x\frac{dy}{dx} = 2$

A. 2

B. -1

C. -2

D. 1

Answer: A

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111. If $y = \frac{\left(\sin^{-1}x\right)^2}{2}$, $then\left(1 - x^2\right)y_2 - xy_1 =$

A. y

B. 2y

C. 1

D. 2

Answer: C

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112. If $\sqrt{y} = \cos^{-1}x$, then it satisfies the dIfferential equation $\left(1 - x^2\right)\frac{d^2y}{dx^2} - x\frac{dy}{dx} = c$, where c is equal to

A. 0

B. 3

C. 1

D. 2

Answer: D

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113. If $\sqrt{r} = ae^{\theta\cot\alpha}$, where a and α are real numbers, then $\frac{d^2r}{d\theta^2} - 4r\cot^2\alpha$ is

A. r

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

C. 1

D. 0

Answer: D

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114. If $y = \frac{2}{\sqrt{a^2 - b^2}} \tan^{-1}\left[\sqrt{\frac{a - b}{a + b}} \tan\left(\frac{x}{2}\right)\right]$ then $\frac{d_2 y}{dx^2}\left|(=), \left(x = \frac{\pi}{2}\right):\right|$

A. $\frac{b}{2a^2}$

B. $\frac{b}{a^2}$

C. $\frac{2b}{a}$

D. $\frac{b^2}{2a}$

Answer: B

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115. If $u = x^2 + y^2$ and $x = s + 3t, y = 2s - t,$ then $\frac{d^2u}{ds^2}$ is equal to

A. 12

B. 32

C. 36

D. 10

Answer: D

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116. If $x = at^2, y = 2at$, then $\frac{d^2x}{dy^2} =$

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

B. $-2at^3$

C. $\frac{-1}{2at^3}$

D. $\frac{-1}{t^2}$

Answer: A

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117. If $x = f(t)$ and yy=g(t) are differentiable functions of t then $\frac{d^2y}{dx^2}$ is

A. $\frac{f'(t).g''(t) - g'(t).f''(t)}{[f'(t)]^3}$

B. $\frac{f'(t).g''(t) - g'(t).f''(t)}{[f'(t)]^2}$

C. $\frac{g'(t).f''(t) - f'(t).f''(t)}{[f'(t)]^3}$

D. $\frac{g'(t).f''(t) + f'(t).f''(t)}{[f'(t)]^3}$

Answer: A

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118. If $y = \left(x + \sqrt{1+x^2}\right)^n$ then $\left(1+x^2\right)\frac{d^2y}{dx^2} + x\frac{dy}{dx}$

A. n^2y

B. n^2y

C. $-y$

D. $2x^2y$

Answer: A

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119. If $x^2y^3 = (x+y)^5$, then $\frac{d^2y}{dx^2}$ is

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

B. $\frac{x + \frac{dy}{dx} + y}{y^2}$

C. 1

D. 0

Answer: D

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120. If $x = \sin t$ and $y = \sin pt$, prove that $\left(1 - x^2\right)\frac{d^2y}{dx^2} - x\frac{dy}{dx} + p^2y = 0.$

A. 0

B. 1

C. -1

D. $\sqrt{2}$

Answer: A

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121. If $x = \cos\theta, y = \sin 5\theta$ then $\left(1 - x^2\right)\frac{d^2y}{dx^2} - x\frac{dy}{dx} =$

A. $-5y$

B. 5y

C. 25y

D. $-25y$

Answer: D

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

A. y

B. xy

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

D. $\sqrt{xy}$

Answer: C

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123. If $x = 2at^3, y = at^4$, then $\frac{d^2y}{dx^2}$ at t=2 is

A. 4

B. 2a

C. $\frac{1}{2a}$

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

Answer: C

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124. If $x = a\cos\theta, y = b\sin\theta$, then $\frac{d^2y}{dx^2}$ when $\theta = \frac{\pi}{4}$ is given by

A. $-2\sqrt{2}\frac{b}{a^2}$

B. $2\sqrt{2}\frac{b}{a^2}$

C. $\frac{\sqrt{2}a^2}{b}$

D. $\frac{2a^2}{b}$

Answer: A

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125. If $y = x^3 \log(\log(1 + x))$, *then* $y''(0) =$

A. 0

B. -1

C. $6\log_e 2$

D. 6

Answer: A

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126. If $x = e^t \sin t, y = e^t \cos t$, t is a parameter , then $\frac{d^2y}{dx^2}$ at (1,1) is equal to

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

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

C. 0

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

Answer: A

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127. If $x = 3\cos t$ and $y = 4\sin t$, then $\frac{d^2y}{dx^2}$ at the point $\left(x_0, y_0\right) = \left(\frac{3}{2}\sqrt{2}, 2\sqrt{2}\right)$,is

A. $\frac{4\sqrt{2}}{9}$

B. $-\frac{4\sqrt{2}}{9}$

C. $-\frac{8\sqrt{2}}{9}$

D. $\frac{8\sqrt{2}}{9}$

Answer: C

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128. If $f: R \in R$ is defined by

$f(x) = \frac{x^2 - ax + 1}{x^2 + ax + 1}, 0 < a < 2$, the which of the following is true:

A. $(2 + a)^2 f'(1) + (2 - a)^2 f'(-1) = 0$

B. $(2 - a)^2 f'(1) - (2 + a)^2 f'(-1) = 0$

C. $f'(1) f'(-1) = (2 - a)^2$

D. $f'(1) f'(-1) = -(2 + a)^2$

Answer: A

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129. If $y = \frac{a^{\cos^{-1}x}}{1 + a^{\cos^{-1}x}}$ and $z = a^{\cos^{-1}x}$, *then* $\frac{dy}{dx} =$

A. $\frac{1}{1 + a^{\cos^{-1}x}}$

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

C. $\frac{1}{\left(1 + a^{\cos^{-1}x}\right)^2}$

D. None of these

Answer: C

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130. The first derivative of the function $\left[\cos^{-1}\left(\sin\sqrt{\frac{1 + x}{2}}\right) + x^x\right]$ with respect to x at $x = 1$ is

A. $\frac{3}{4}$

B. 0

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

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

Answer: A

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131. Let $g(x)$ be the inverse of the function $f(x)$, and $f'(x) = \frac{1}{1+x^3}$ then $g'(x)$ equals

A. $\frac{1}{1+[g(x)]^3}$

B. $\frac{1}{1+[f(x)]^3}$

C. $1+[g(x)]^3$

D. $1+[f(x)]^3$

Answer: C

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132. Let $f(x) = \tan^{-1}x$. Then, $f'(x) + f''(x)$ is $= 0$, when x is equal to

A. 0

B. 1

C. i

D. $-i$

Answer: B

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133. If $x = a\left(t - \frac{1}{t}\right), y = a\left(t + \frac{1}{t}\right)$, show that $\frac{dy}{dx} = \frac{x}{y}$

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

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

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

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

Answer: C

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134. If $2y = \sin^{-1}(x + 5y)$, *then*, $\frac{dy}{dx}$ is equal to

A. cos 2y-5

B. cos 2y+5

C. 2cos 2y +5

D. 2cos 2y-5

Answer: D

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135. Let $f: R \to R$ be a function such that $f(x + y) = f(x) + f(y)$ for all, $x, y \in R$

If f(x) is differentiable at x=0. then, which one of the following is incorrect?

A. f(x) is continuous for all $x \in R$

B. f'(x) is constant for all $x \in R$

C. f(x) is dIfferentiable for all $x \in R$

D. f(x) is dIfferentiable only in a finite interval containing zero

Answer: D

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136. If $x^2 + y^2 = \left(t + \frac{1}{t}\right)$ and $x^4 + y^4 = t^2 + \frac{1}{t^2}$, then $x^3 y \frac{dy}{dx} =$

A. -1

B. -2

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

D. xy

Answer: B

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137. Let $f_1(x) = e^x, f_2(x) = e^{f_1(x)}, \ldots\ldots, f_{n+1}(x) = e^{f_n(x)}$ for all $n \geq 1$. Then for any fixed n, $\frac{d}{dx} f_n(x)$ is

A. $f_n(x)$

B. $f_n(x) f_{n-1}(x)$

C. $f_n(x)f_{n-1}...f_1(x)$

D. $f_n(x)...f_1(x)e^x$

Answer: C

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138. Let $f: R \to R$ be a dIfferentiable function . If f is even, then f'(0) is equal to

A. 1

B. 2

C. 0

D. -1

Answer: C

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EVALUATION TEST

1. If $f(x) = \frac{x-1}{4} + \frac{(x-1)^2}{12} + \frac{(x-1)^5}{20} + \frac{(x-1)^7}{28} + \ldots$

where $0 < x < 2$, then f'(x) is equal to

A. $\frac{1}{4x(2-x)}$

B. $\frac{1}{4x(2-x)^2}$

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

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

Answer: A

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2. If $f(x) = (\cos x + i\sin x)(\cos 3x + i\sin 3x)...(\cos(2n - 1)x + i\sin(2n - 1)x)$ then $f(x)$ is

A. n^2y

B. $-n^4y$

C. $-n^2y$

D. n^4y

Answer: B

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3. If $y = f\left(\frac{3x + \pi}{5x + 4}\right)$ and $f'(x) = \tan^2 x$, then $\frac{dy}{dx}$ at x=0 is

A. $\frac{12 + 5\pi}{16}$

B. $\frac{12 - 5\pi}{16}$

C. $\frac{5 + 12\pi}{16}$

D. $\frac{5 - 12\pi}{16}$

Answer: B

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4. If $y = |\cos x| + |\sin x|$, then $\frac{dy}{dx}$ at $x = \frac{2\pi}{3}$ is

A. 0

B. 1

C. $\frac{1 - \sqrt{3}}{2}$

D. $\frac{\sqrt{3} - 1}{2}$

Answer: D

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5. If $y = \left(1 + \frac{2}{x}\right)\left(1 + \frac{2}{x}\right)\left(1 + \frac{3}{x}\right)...\left(1 + \frac{n}{x}\right)$ $x \neq 0$, then $\frac{dy}{dx}$ when x = - 1 is

A. nl

B. $(n - 1)l$

C. $(-1)^n(n - 1)l$

D. $(-1)^n nl$

Answer: C

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6. If $f(x) = \frac{x}{1 + |x|}$ for $x \in R$, then $f'(0) =$

A. 0

B. 1

C. 2

D. 3

Answer: B

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7. If $y = f\left(\frac{2x+3}{3-2x}\right)$ and $f(x) = \sin(\log x)$, then $\frac{dy}{dx} =$

A. $\frac{12}{9-4x^2}\cos\left\{\log\left(\frac{2x+3}{3-2x}\right)\right\}$

B. $\frac{12}{4x^2-9}\cos\left\{\log\left(\frac{2x+3}{3-2x}\right)\right\}$

C. $\frac{12}{9-4x^2}\cos\left\{\log\left(\frac{3-2x}{2x+3}\right)\right\}$

D. None of these

Answer: A

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8. $\frac{d}{dx}\left[a\tan^{-1}x + b\log\left(\frac{x-1}{x+1}\right)\right] = \frac{1}{x^4-1} \Rightarrow a - 2b =$

A. 1

B. -1

C. 0

D. 2

Answer: B

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9. If $f(x) = \cos x \cos 2x \cos 4x \cos(8x).\ \cos 16x$ then find $f'\left(\frac{\pi}{4}\right)$

A. $\sqrt{2}$

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

C. 1

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

Answer: A

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10. If $\frac{d}{dx}\left(\frac{1+x^4+x^8}{1+x^2+x^4}\right) = ax^3 + bx$,then

A. a=4,b=2

B. a=4,b=-2

C. a=-2,b=4

D. None of these

Answer: B

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11. If $2x = y^{\frac{1}{5}} + y^{-\frac{1}{5}}$ then $\left(x^2 - 1\right)\frac{d^2y}{dx^2} + x\frac{dy}{dx} = ky$, then find the value of k.

A. -25

B. 25

C. 16

D. -16

Answer: B

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12. if $\sqrt{x^2+y^2} = ae^{\tan^{-1}\left(\frac{y}{x}\right)}, a > 0, (y(0) > 0)$ then $y(0)$ equals

A. $\frac{a}{2}e^{-\frac{n}{2}}$

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

C. $-\frac{2ae^{\frac{\pi}{2}}}{3}$

D. $\frac{-2}{a}e^{\frac{-\pi}{2}}$

Answer: D

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13. If $f(x), g(x), h(x)$ are polynomials in x of degree 2 If

$$F(x) = \begin{vmatrix} f & g & h \\ f' & g' & h' \\ f'' & g'' & h'' \end{vmatrix}$$ then $F'(x)$ is

A. 1

B. 0

C. -1

D. None of these

Answer: B

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14. If y= cos ax and y_n is n^{th} derivative of y, then

$$\begin{vmatrix} y & y_1 & y_2 \\ y_3 & y_4 & y_5 \\ y_6 & y_7 & y_8 \end{vmatrix}$$ is equal to

A. 1

B. -1

C. 0

D. None of these

Answer: C

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15. If $y = \sin\left[\cos^{-1}\left\{\sin\left(\cos^{-1}x\right)\right\}\right]$, then $\frac{dy}{dx}$ at $x = \frac{1}{2}$

A. 0

B. -1

C. $\frac{2}{\sqrt{3}}$

D. 1

Answer: D

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16. If $8f(x) + 6f\left(\frac{1}{x}\right) = x + 5$ and $y = x^2(f(x)$, then $\frac{dy}{dx}$ at $x = -1$ is equal to 0 (b) $\frac{1}{14}$ (c) $-\frac{1}{4}$ (d) None of these

A. 0

B. $\frac{1}{14}$

C. $-\frac{1}{14}$

D. None of these

Answer: C

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17. If the function f defined on R-{0} os a dIfferentiable function and $f\left(x^3\right) = x^5$ for all x, then f'(27)=

A. 15

B. 45

C. 9

D. 27

Answer: A

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18. If the function $f(x) = x^3 + e^{x/2}$ and $g(x) = f^{-1}(x)$, then the value of $g'(1)$ is

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

B. 2

C. 1

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

Answer: B

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19. If $y = f\left(x^3\right), z = g\left(x^5\right), f'(x) = \tan x$ and $g'(x) = \sec x$, then $\frac{dy}{dz} =$

A. $\frac{3\tan x^3}{5x^2\sec x^5}$

B. $\frac{5x^2\sec x^5}{3\tan x^3}$

C. $\frac{3x^2\tan x^3}{5\sec x^5}$

D. None of these

Answer: A

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20. If `sqrt(1-x^6)+sqrt(1-y^6)=a(x^3-y^3),p rov et h a t(dy)/(dx)= (x^2)/(y^2)sqrt((1-y^6)/(1-x^6,)w h e r e-1x,1a n d-1

A. $\frac{x^2}{y^2}\sqrt{\frac{1-y^6}{1-x^6}}$

B. $\frac{y^2}{x^2}\sqrt{\frac{1-y^6}{1-x^6}}$

C. $\frac{x^2}{y^2}\sqrt{\frac{1-x^6}{1-y^6}}$

D. None of these

Answer: A

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21. Let$f(x)$ be a polynomial function of second degree. If $f(1) = f(-1)$ and a, b,c are in A.P, the $f'(a), f'(b)$ and $f'(c)$ are in

A. A.P.

B. G.P.

C. H.P.

D. None of these

Answer: A

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

A. $\left(x^2+4\right)\left(\frac{dy}{dx}\right)^2 = n^2\left(y^2+4\right)$

B. $\left(x^2+4\right)\left(\frac{dy}{dx}\right)^2 = x^2\left(y^2+4\right)$

C. $\left(x^2+4\right)\left(\frac{dy}{dx}\right)^2 = \left(y^2+4\right)$

D. None of these

Answer: A

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23. If $f(x) = \begin{vmatrix} x & \sin x & \cos x \\ x^2 & \tan x & x^3 \\ 2x & \sin 2x & 5x \end{vmatrix}$ then

$\lim_{x \to 0} \frac{f'(x)}{x}$ is equal to

A. 4

B. -4

C. 2

D. -2

Answer: B

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24. If g is the inverse of a function f and $f'(x) = \frac{1}{1+x^5}$, then g'(x) is equal to

A. $1 + [g(x)]^5$

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

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

D. $5x^4$

Answer: A

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25. If

$$y = \sin x\left[\frac{1}{\sin x \sin 2x} + \frac{1}{\sin 2x \sin 3x} + \ldots + \frac{1}{\sin nx \sin(n+1)x}\right] \text{then } \frac{dy}{dx} =$$

A. $\cot x - \cot(n+1)x$

B. $(n+1)\text{cosec}^2(n+1)x - \text{cosec}^2 x$

C. $\text{cosec}^2 x - (n+1)\text{cosec}^2(n+1)x$

D. $\cot x + \text{cosec}^2 x$

Answer: B

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26. if $y = e^{\sin^2 x + \sin^4 x + \sin^6 x + \ldots\ldots\ldots\infty}$ then find $\frac{dy}{dx}$

A. $e^{\tan_2 x}$

B. $e^{\tan_2 x}\sec^2 x$

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

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

Answer: C

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27. If $y = \frac{\tan^{-1}1}{1+x+x^2} + \frac{\tan^{-1}1}{x^2+3x+3} + \frac{\tan^{-1}1}{x^2+5x+7} + + \text{upto } n \text{ terms}$, then find the value of $y'(0)$.

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

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

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

D. None of these

Answer: B

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28. If y=a sin (bx+c), then y_n=

A. $a^n \sin\left(bx + c\frac{n\pi}{2}\right)$

B. $b^n \sin\left(bx + c\frac{n\pi}{2}\right)$

C. $ab^n \sin\left(bx + c\frac{n\pi}{2}\right)$

D. $ab^n \cos\left(bx + c\frac{n\pi}{2}\right)$

Answer: C

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29. If $f(x) = x^n, n\varepsilon N,$ then the value of $f(1) - \frac{f'(1)}{1!} + \frac{f(1)}{2!} - \left(f'''\right)\frac{1}{3!} + \ldots + (-1)^n \frac{f^n(1)}{n!}$ is

A. 2^n

B. 0

C. 2^{n+1}

D. None of these

Answer: B

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30. If $p = a^2\cos^2\theta + b^2\sin^2\theta$, where $a^2 + b^2 + c^2, then 4p + \frac{d^2p}{d\theta^2}$ is equal to

A. c^2

B. $2c^2$

C. $4c^2$

D. $8c^2$

Answer: B

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Others

1. If $y = e^{\tan x}$, then $\left(\cos^2 x\right)\frac{d^2}{dx^2} =$

A. $(1 - \sin 2x)\frac{dy}{dx}$

B. $-(1 + \sin 2x)\frac{dy}{dx}$

C. $(1 + \sin 2x)\frac{dy}{dx}$

D. $(\sin 2x - 1)\frac{dy}{dx}$

Answer: C

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2. If $y = e^{m\cos^{-1}x}$, then $\left(1 - x^2\right)y_2 - xy_1 - m^2y$ is equal to

A. 0

B. 1

C. -1

D. $2m^2$

Answer: A

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

4 (b) 3 (c) 1 (d) 0

A. 0

B. 1

C. 4

D. 3

Answer: C

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4. For $y = \cos\left(m\sin^{-1}x\right)$, which of the following is true?

A. $\left(1 - x^2\right)y_2 + xy_1 - m^2y = 0$

B. $\left(1 - x^2\right)y_2 - xy_1 + m^2y = 0$

C. $\left(1 + x^2\right)y_2 + xy_1 + m^2y = 0$

D. $(1 + x)y_2 - xy_1 + m^2y = 0$

Answer: B

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5. If $y^2 = ax^2 + bx + c$, then $y^3\frac{d^2y}{dx^2}$ is (a) a constant (b) a function of x only (c) a function of y only (d) a function of x and y

A. constant

B. function of x only

C. function of y only

D. function of x and y

Answer: A

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6. If $y = \tan^{-1}\left[\frac{\log ex}{\log\left(\frac{e}{x}\right)}\right] + \tan^{-1}\left[\frac{8 - \log x}{1 + 8\log x}\right]$, then $\frac{d^2y}{dx^2}$ is

A. 1

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

C. -1

D. 0

Answer: D

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7. If $x = \sin t$ and $y = \sin^3 t$, then $\frac{d^2y}{dx^2}$ at $t = \frac{\pi}{2}$ is

A. 2

B. 4

C. 6

D. 8

Answer: C

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8. If $x = a(1 - \cos\theta)$, $y = a(\theta + \sin\theta)$, then value of $\frac{d^2y}{dx^2}$ at $\theta = \frac{\pi}{2}$ is .

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

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

C. a

D. $-a$

Answer: B

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9. The second order derivative of $a\sin^3 t$ w.r.t, $a\cos^3 t$ at $t = \frac{\pi}{4}$ is

A. $\frac{4\sqrt{2}}{3a}$

B. 2

C. $\frac{1}{12a}$

D. $\frac{3a}{4}$

Answer: A

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

A. 0

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

C. $\frac{1}{e^2}$

D. $\frac{1}{e^3}$

Answer: C

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11. Derivative of even function is

A. is always an even function

B. is always an odd function

C. may be an odd function

D. none of these

Answer: B

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12. If y=f(x) is an odd differentiable function defined on $(-\infty, \infty)$ such that $f'(3) = -2 then f'(-3)$ equals -

A. 0

B. 1

C. 2

D. 4

Answer: C

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13. If $\left(\frac{y}{x}\right) + \left(\frac{x}{y}\right) = 2$, then $\frac{dy}{dx}$ is equal to

A. 2xy

B. 1

C. -1

D. 0

Answer: B

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14. If $y = e^x . e^{2x} . e^{3x} \ldots . e^{nx}$, then $\frac{dy}{dx}$=

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

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

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

D. ny

Answer: B

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15. If $:y = \sqrt{\frac{1 + e^x}{1 - e^x}}$, then: $\frac{dy}{dx} =$

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

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

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

D. $\frac{e^x}{\left(1 - e^x\right)\sqrt{1 + e^x}}$

Answer: A

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