MATHS

BOOKS - DEEPTI MATHS (TELUGU ENGLISH)

DIFFERENTIATION

EAMCET MATHAMETICS IB

1. If $x = a\cos\theta, y = b\sin\theta$ then $\frac{dy}{dx} =$

A. $\frac{b}{a}\cos ec\theta$

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

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

D. $\frac{-b}{\alpha}\tan h\theta$

Answer: B

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

A. $\tan\theta$

B. $\cot\theta$

C. $\cot\frac{\theta}{2}$

D. $\tan\frac{\theta}{2}$

Answer: A

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

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

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

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

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

Answer: A

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4. The derivatiove of tanx w.r.t. sec x is

A. tan x

B. cosec x

C. cot x

D. cos x

Answer: B

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5. If

$f(x) = \tan^{-1}\left(\frac{3x - x^3}{1 - 3x^2}\right), g(x) = \cos^{-1}\left(\frac{1 - x^2}{1 + x^2}\right)$ and $0 < \alpha < \frac{1}{2}$,

then $\lim_{x \to \alpha} \frac{f(x) - f(a)}{g(x) - g(a)}$

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

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

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

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

Answer: D

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6. If $x = \exp\left[\tan^{-1}\left(\frac{y - x^2}{x^2}\right)\right]$ then $\frac{dy}{dx} =$

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

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

C. $2x\left[1+\tan(\ln x)+\sec^2(\ln x)\right]$

D. 0

Answer: A

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7. If $f(x)=\sin\left(2x^2-2[x]\right)$ for $0<x<1$, then $f'\left(\frac{\sqrt{\pi}}{2}\right)=$

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

B. $-\sqrt{2}$

C. 0

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

Answer: C

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

A. 1

B. 2

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

D. 0

Answer: A

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9. If $f(x) = \sin\left(2x^2 - 2[x]\right)$ for $0 < x < 1,$ then $f'\left(\frac{\sqrt{\pi}}{2}\right) =$

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

B. $-\sqrt{\pi}$

C. 0

D. $\frac{\sqrt{\pi}}{2}$

Answer: C

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

A. 1

B. 2

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

D. 0

Answer: A

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EXERCISE 1A

1. $\frac{d}{dx}\left\{3\sqrt[3]{x}-\frac{4}{\sqrt[4]{x}}\right\}=$

A. $x^{-2/3}+x^{-5/4}$

B. $x^{-1/3}+x^{-5/4}$

C. $x^{-2/3}+x^{-3/4}$

D. $x^{-1/3}+x^{-3/4}$

Answer: A

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

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

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

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

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

Answer: A

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3. $\frac{d}{dx}\left\{x^n + \frac{1}{x^n}\right\} =$

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

B. $nx^{n+1}\frac{n}{x^{n+1}}$

C. $nx^{n+1}\frac{n}{n^{n+1}}$

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

Answer: D

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

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

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

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

D. none

Answer: B

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5. $\frac{d}{dx}\left\{\log\left(\frac{x}{e^{\tan x}}\right)\right\} =$

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

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

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

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

Answer: B

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

A. $y(\log_{10} 2)^2$

B. $y(\log_e 2)^2$

C. $y2^x(\log_e 2)^2$

D. $y \log_e 2$

Answer: C

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8. If $h(x) = e^{e^x}$ then $\frac{h'(x)}{h(x)}$

A. $h(x)$

B. $\frac{1}{h(x)}$

C. $(\log h(x)$

D. $-\log h(x)$

Answer: C

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9. If $y = 2^{ax}$ and $\frac{dy}{dx} = \log 256atx = 1,$ then a =

A. 0

B. 1

C. 2

D. 3

Answer: C

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10. $f(x)=\frac{1}{1+\frac{1}{x}} g(x)=\frac{1}{1+\frac{1}{f(x)}} \Rightarrow g'(2)=$

A. $1/5$

B. $1/25$

C. 5

D. $1/16$

Answer: B

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11. The derivative of log $|\sin x|$ w.r.t x is

A. sin x

B. cos x

C. tan x

D. cot x

Answer: D

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12. The derivative for log $|\sec x|$ w.r.t x is

A. sin x

B. cos x

C. tan x

D. cot x

Answer: C

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13. The derivative of $\log_x a$ w.r.t x is

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

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

C. $\frac{\log a}{x(\log x)}$

D. none

Answer: B

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14. The derivative of $\tan^3(5x-3)$ w.r.t is

A. $15\tan^2(5x-3)\sec^2(5x-3)$

B. $15\tan^2(5x+3)\sec^2(5x-3)$

C. $15\tan^2(5x-3)\sec^2(5x+3)$

D. $15\tan^2(5x+3)\sec^2(5x+3)$

Answer: A

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15. The derivative of $\sec(a^x)+x^n)^2$ w.r.t x is

A. $2(a^x+x^a)\left(a^x\log a+ax^{n-1}\right)\sec(a^x+x^n)^2\tan(a^x+x^n)^2$

B. $2(a^x-x^a)\left(a^x\log a+ax^{n-1}\right)\sec(a^x-x^n)^2\tan(a^x+x^n)^2$

C. $2(a^x+x^a)\left(a^x\log a-ax^{n-1}\right)\sec(a^x+x^n)\tan(a^x-x^n)^2$

D. $2(a^x-x^a)\left(a^x\log a+ax^{n-1}\right)\sec(a^x+x^n)\tan(a^x-x^n)^2$

Answer: A

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16. The derivative of $\log\left(x^2+1\right)$ w.r.t x is

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

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

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

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

Answer: B

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17. $\frac{d}{dx}\log\left(x+\sqrt{x^2+1}\right)\} =$

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

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

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

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

Answer: B

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18. The deriative of $\log\left(x+\sqrt{x^2-1}\right)$ w.r.t x is

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

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

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

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

Answer: C

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19. The derivative of $\log\left(x+\sqrt{x^2+a^2}\right)$ w.r.t x is

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

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

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

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

Answer: A

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20. The derivative of $\left(x+\sqrt{x^2+1}\right)^n$ w.r.t x is

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

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

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

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

Answer: A

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21. The derivative of $\left(x+\sqrt{x^2-1}\right)^m$ w.r.t x is

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

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

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

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

Answer: B

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22. The derivative of $\log[\log(\log x)]$ w.r.t x is

A. $\dfrac{1}{x\log x\log(\log x)}$

B. $\dfrac{1}{\log x\log(\log x)}$

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

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

Answer: A

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23. The derivative of $\log |\sec x + \tan x|$ w.r.t x is

A. sin x

B. tan x

C. sec x

D. cosec x

Answer: C

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24. The derivative of $\log|\cos ecx - \cot x|$ w.r.t x is

A. sin x

B. tan x

C. sec x

D. cosec x

Answer: D

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25. $\frac{d}{dx}\left[\frac{x}{2} + \frac{1}{2}\log|\sin x + \cos x|\right] =$

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

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

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

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

Answer: D

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26. If $y = x\log\left|x + \sqrt{1+x^2}\right| - \sqrt{1+x^2}$ then $\frac{dy}{dx} =$

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

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

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

D. none

Answer: C

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27. The derivative of $\sqrt{\tan\sqrt{x}}$ w.r.t x is

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

B. $\frac{\sec^2\sqrt{2}}{4\sqrt{x\tan\sqrt{x}}}$

C. $\frac{-\sin\sqrt{x}}{4\sqrt{x}\cos\sqrt{x}}$

D. $\frac{-\sec^2\sqrt{x}}{4\sqrt{x}\tan\sqrt{x}}$

Answer: C

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28. The derivative of $\sqrt{\tan\sqrt{x}}$ w.r.t x is

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

B. $\frac{\sec^2\sqrt{x}}{4\sqrt{x}\tan\sqrt{x}}$

C. $\frac{-\sin\sqrt{x}}{4\sqrt{x}\cos\sqrt{x}}$

D. $\frac{-\sec^2\sqrt{x}}{4\sqrt{x}\tan\sqrt{x}}$

Answer: B

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29. $\frac{d}{dx}\left\{\frac{1}{\sqrt{3x+2}}\right\} =$

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

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

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

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

Answer: B

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30. If $y = \sqrt{ax} + \frac{a^2}{\sqrt{ax}} then y_1, y_2$ at $x = a$ are

A. a

B. 0

C. 1

D. -1

Answer: B

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31. The derivative of $\sqrt{\sin x + \sqrt{\sin x}}$ w.r.t x is

A. $-\dfrac{\cos x\left(1+2\sqrt{\sin x}\right)}{4\sqrt{\sin^2 x + \sin x\sqrt{\sin x}}}$

B. $-\dfrac{\cos x\left(1+2\sqrt{\sin x}\right)}{4\sqrt{\sin^2 x - \sin x\sqrt{\sin x}}}$

C. $\dfrac{\cos x\left(1-2\sqrt{\sin x}\right)}{4\sqrt{\sin^2 + \sin x\sqrt{\sin x}}}$

D. $\dfrac{\cos x\left(1-2\sqrt{\sin x}\right)}{4\sqrt{\sin^2 - \sin x\sqrt{\sin x}}}$

Answer: A

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32. The derivative of $\sqrt{\tan x + \sqrt{\tan x}}$ w.r.t x is

A. $\frac{\sec^2 x\left[1+2\sqrt{\tan x}\right]}{4\sqrt{\tan^2 x+\tan x\sqrt{\tan x}}}$

B. $\frac{\sec^2 x\left[1-2\sqrt{\tan x}\right]}{4\sqrt{\tan^2 x+\tan x\sqrt{\tan x}}}$

C. $\frac{\sec x\left[1+2\sqrt{\tan x}\right]}{4\sqrt{\tan^2 x+\tan x\sqrt{\tan x}}}$

D. $\frac{\sec x\left[1-2\sqrt{\tan x}\right]}{4\sqrt{\tan^2 x+\tan x\sqrt{\tan x}}}$

Answer: A

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33. $\frac{d}{dx}\left\{\log\left(\sqrt{\cos ecx+1}-\sqrt{\cos ec-1}\right)\right\}=$

A. $\cos ecx$

B. $2\cos ecx$

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

D. $\cot x$

Answer: C

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34. The derivative of $\left(x^2+1\right)^5(2x+3)^3$ w.r.t x is

A. $6\left(x^2+1\right)^5(2x+3)^2+10x\left(x^2+1\right)^4(2x+3)^3$

B. $6\left(x^2-1\right)^5(2x+3)^2+10x\left(x^2+1\right)^4(2x+3)^3$

C. $6\left(x^2+1\right)^5(2x-3)^2+10x\left(x^2+1\right)^4(2x-3)^3$

D. $6\left(x^2-1\right)^5(2x+3)^2+10x\left(x^2+1\right)(2x-3)^3$

Answer: A

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35. The derivative of sin mx cos nx w.r.t x is

A. m cos mx cos nx + n sin mx sin nx

B. m cos mx cos nx - n sin mx sin nx

C. m sin mx cos nx + n sin mx cos nx

D. m sin mx cos nx-n sin mx cos nx

Answer: B

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36. The derivative of $x\sqrt{\sin x}$ w.r.t x is

A. $\frac{2\sin x + x\cos x}{2\sqrt{\sin x}}$

B. $\frac{2\sin x - x\cos x}{2\sqrt{\sin x}}$

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

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

Answer: A

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37. The derivative of $x^2\cos^3 2x$ w.r.t x is

A. $2x \sin^2 2x(\cos 2x - 3x \sin 2x)$

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

C. $2x \cos^2 2x(\cos 2x - 3x \sin 2x)$

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

Answer: C

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38. $\frac{d}{dx}\{e^{ax} \sin(bx + c)\} =$

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

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

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

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

Answer: A

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39. The derivative of $e^{ax}\cos(bx+c)$ w.r.t x is

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

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

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

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

Answer: B

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40. The derivative of $\sin^5 3x\cos^3 2x$ w.r.t x is

A. $3\sin^4\cos^2 2x(5\cos 2x\cos 3x-2\sin 3x\sin 2x)$

B. $3\sin^4 3x\cos^2 2x(5\cos 2x\cos 3x+2\sin 3x\sin 2x)$

C. $3\cos^2 5x\sin 3x(5\cos 3x\cos 5x+2\sin 5x\sin 3x)$

D. $3\cos^2 5x \sin 3x(5\cos 3x \cos 5x - 2\sin 5x \sin 3x)$

Answer: A

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41. $\frac{d}{dx}\left\{\frac{(2x^2-3x+5)^2}{(5x-2)^3}\right\} =$

A. $\frac{(2x^2+3x+5)(1-x^2-x-63)}{(5x-2)^4}$

B. $\frac{(2x^2-3x+5)(10x^2+x-63)}{(5x-2)^4}$

C. $\frac{(2x^2+3x+5)(10x^2+x-63)}{(5x-2)^4}$

D. $\frac{(2x^2-3x+5)(10x^2-x-63)}{(5x-2)^4}$

Answer: D

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42. $\frac{d}{dx}\left\{\frac{1-\cos 2x}{3+2\sin 2x}\right\} =$

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

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

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

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

Answer: B

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43. $\frac{d}{dx}\left\{\tan^2\left(\frac{1+x}{1-x}\right)\right\} =$

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

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

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

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

Answer: B

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

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

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

C. $-\frac{4x}{(1+x^2)^2}\sin\left(\frac{1-x^2}{1+x^2}\right)$

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

Answer: A

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

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

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

C. $\frac{-4x}{(1-x^2)^2}\sin 2\left(\frac{1-x^2}{1+x^2}\right)$

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

Answer: C

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46. $\frac{d}{dx}\left\{\sqrt{\frac{1+x^2}{1-x^2}}\right\} =$

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

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

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

D. $\frac{2x}{(1-x^2)\sqrt{1-x^4}}$

Answer: D

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

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48. $\frac{d}{dx}\left\{\sqrt{\frac{1+\sin x}{1-\sin x}}\right\} =$

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

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

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

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

Answer: B

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49. $\frac{d}{dx}\left\{\frac{\sin x+\cos x}{\sqrt{1+\sin 2x}}\right\} =$

A. 0

B. 1

C. 2

D. 3

Answer: A

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50. $\frac{d}{dx}\left\{\frac{\sqrt{a^2+x^2}+\sqrt{a^2-x^2}}{\sqrt{a^2+x^2}-\sqrt{a^2-x^2}}\right\} =$

A. $\frac{2a^2}{x^2}\left\{1+\frac{a^2}{\sqrt{a^4-x^4}}\right\}$

B. $\frac{2a^2}{x^3}\left\{1+\frac{a^2}{\sqrt{a^4-x^4}}\right\}$

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

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

Answer: B

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51. $\frac{d}{dx}\left\{\frac{\log\left(\sqrt{1+x}+\sqrt{1-x}\right)}{\sqrt{1+x}-\sqrt{1-x}}\right\} =$

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

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

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

D. none

Answer: D

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52. $\frac{d}{dx}\left\{\log\left(\frac{\sqrt{x+1}-1}{\sqrt{x+1}+1}\right)+\frac{\sqrt{x}}{\sqrt{x+1}}\right\} =$

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

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

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

D. none

Answer: A

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53. $\frac{d}{dx}\left\{a\log\left(\frac{a+\sqrt{a^2-x^2}}{x}\right)-\sqrt{a^2-x^2}\right\}=$

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

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

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

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

Answer: B

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54. $\frac{d}{dx}\left\{\log\left(\frac{\sqrt{x+a}+\sqrt{x-a}}{\sqrt{x-b}-\sqrt{x-c}}\right)\right\} =$

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

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

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

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

Answer: A

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55. If $y = \log_{\cos x} \sin x$, then , $\frac{dy}{dx} =$

A. $(\cot x \log\cos x + \tan x \log\sin x)/(\log\cos x)^2$

B. $(\tan x \log\cos x + \cot x \log\sin x)/(\log\cos x)^2$

C. $\cot x \log\cos x + \tan x \log\sin x)/(\log\sin x)^2$

D. none

Answer: A

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56. If $f(x) = x - x^2 + x^3 - x^4 + \ldots. \infty, |x| < 1,$ then $f'(x) =$

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

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

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

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

Answer: B

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57. $\frac{d}{dx}\{(x+a)(x^2+a^2)(x^4+a^4)(x^8+a^8)\} =$

A. $\frac{15x^{16} - 16x^{15}a + a^{16}}{(x-a)^2}$

B. $\frac{x^{16} - x^{15}a + a^{16}}{(x-a)^2}$

C. $\frac{x^{16} - x^{16}}{x - a}$

D. none

Answer: D

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58.

$\frac{d}{dx}\left[(x+1)\left(x^2+1\right)\left(x^4+1\right)\left(x^8+1\right)\right] = (15x^p - 16x^q + 1)(x-1)^{-2} \Rightarrow$

A. $(12, 11)$

B. $(15, 14)$

C. $(16, 14)$

D. $(16, 15)$

Answer: D

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59. If $y = (1+x)(1+x^2)..(1+x^{2n})$, then $\left(\frac{dy}{dx}\right)_{x=0}$ is equal to

A. 0

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

C. 1

D. 2

Answer: C

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60. If $y = \log_a x + \log_x a + \log_x x + \log_a a$ then $\frac{dy}{dx} =$

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

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

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

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

Answer: D

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61. $f(x) = \log\left(e^x \left(\frac{x-2}{x+2}\right)^{3/4}\right) \Rightarrow f'(0) =$

A. $1/4$

B. 4

C. $-3/4$

D. 1

Answer: A

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62. If $y = 1\frac{1}{1!} + \frac{x^2}{2!} + ..$ then $\frac{dy}{dx} =$

A. e^x

B. $1/1+x$

C. $\cos x$

D. none

Answer: A

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63. For $|x|<1$ if $1+x+x^2\ldots$ then $\frac{dy}{dx}=$

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

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

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

D. none

Answer: C

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64. If $|x| < 1$ then $\frac{d}{dx}(1 - 2x + 3x^2 + \ldots) =$

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

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

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

D. none

Answer: C

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65. If $|x| < 1$ then $\frac{d}{dx}(1 + 2x + 3x^2 + \ldots) =$

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

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

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

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

Answer: B

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66. If $|x| < 1$ then $\frac{d}{dx}\left[1 + \frac{px}{q} + \frac{p(p+q)}{2!}\left(\frac{x}{q}\right)^2 + \frac{p(p+q)(p+2q)}{3!}\left(\frac{x}{q}\right) + \ldots\right] =$

A. $p/q1/(1-x)^{p/q+1}$

B. $(p/q)1/(1-x)^{p/q}$

C. $(1-x)^{p/q-1}$

D. none

Answer: A

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67. If $y = \exp\{\sin^2 + \sin^4 x + \sin^6 x + \ldots\}$ then $\frac{dy}{dx} =$

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

B. $e^{\tan^2} x \sec^2 x$

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

D. none

Answer: C

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68. $\frac{d}{dx}\left[x + \frac{x^3}{3} + \frac{x^5}{5} + \ldots\right] =$

A. $\frac{d}{dx}\left[x + \frac{x^3}{3} + \frac{x^5}{5} + \ldots\right] =$

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

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

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

Answer: A

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69. $\frac{d}{dx}\{\cos x^0\} =$

A. $-\sin x^0$

B. $-\frac{\pi}{180}\sin x^0$

C. $\frac{\pi}{180}\sin x^0$

D. $\frac{2\pi}{180}\sin^0$

Answer: B

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70. The derivative of $\sin^{-1} 2x$ w.r.t x is

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

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

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

D. $-\frac{3}{\sqrt{1-9x^2}}$

Answer: C

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71. The derivative of $\sec^{-1} 5x$ w.r.t x is

A. $\frac{1}{|x|\sqrt{25x^2-1}}$

B. $-\frac{3}{|x|\sqrt{x^2-9}}$

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

D. 2x

Answer: A

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72. The derivative of $\tan^{-1}(x/2)$ w.r.t x is

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

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

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

D. $-\frac{3}{\sqrt{1-9x^2}}$

Answer: A

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73. The derivative of $\cos ec^{-1}(x/3)$ w.r.t is

A. $\frac{1}{|x|\sqrt{25x^2-1}}$

B. $-\frac{3}{|x|\sqrt{x^2-9}}$

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

D. $2x$

Answer: B

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

A. $\frac{1}{|x|\sqrt{25x^2-1}}$

B. $-\frac{3}{|x|\sqrt{x^2-9}}$

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

D. $2x$

Answer: D

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75. The derivative os $\sin^{-1}\cos x$ w.r.t x is

A. 0

B. 1

C. -1

D. 2

Answer: C

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76. If $y = \cot^{-1}\left[\tan\left(\frac{\pi}{2} - x\right)\right]$ then $\frac{dy}{dx} =$

A. x

B. 1

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

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

Answer: B

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77. $\frac{d}{dy}\{\cos[2\sin^{-1}(\cos x)]\} =$

A. $2\sin 2x$

B. $3\cos 2x$

C. 0

D. none

Answer: A

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

A. 1

B. $\sqrt{2}$

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

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

Answer: A

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79. $\frac{d}{dx}\{\sec^{-1} e^x\} =$

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

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

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

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

Answer: A

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80. The derivative of cos h x/2 w.r.t x is

A. $2\,\mathrm{sech}^2\,2x$

B. $\cosh 3x$

C. $\frac{1}{2}\sin h\frac{x}{2}$

D. $-5\cos ech^2 5x$

Answer: C

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81. The derivative of $\tan h^{-1}2x$ w.r.t x is

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

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

C. $\frac{1}{\sqrt{x^2-9}}$

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

Answer: D

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82. The derivative of $\text{sech}^{-1} 3x$ w.r.t x is

A. $\frac{1}{x\sqrt{1-9x^2}}$

B. $-\frac{1}{x\sqrt{1-9x^2}}$

C. $\frac{1}{\sqrt{x^2-9}}$

D. $-\frac{1}{\sqrt{x^2-9}}$

Answer: B

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83. The derivative of $\sin h^{-1} x/2$ w.r.t x is

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

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

C. $\frac{1}{\sqrt{x^2-9}}$

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

Answer: A

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84. The derivative of $\cos^{-1}\sqrt{x}$ w.r.t x is

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

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

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

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

Answer: C

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

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

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

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

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

Answer: B

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86. The derivative of $\tan^{-1}\sqrt{x}$ w.r.t x is

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

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

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

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

Answer: B

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87. If $y = x^3 \sin^{-1} x + (x^2 + 2)\sqrt{1 - x^2}$, then $dy/dx =$

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

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

C. $3x^2 \sin^{-1} x$

D. $9x^2 \sin^{-1} x$

Answer: D

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88. $\frac{d}{dx}\left\{\tan\left(\log \tan^{-1}\sqrt{x}\right)\right\} =$

A. $\frac{\sec^2 \log \tan^{-1}\sqrt{x}}{2(1+x)\sqrt{x}\tan^{-1}\sqrt{x}}$

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

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

D. $\frac{\sec^2(\log x)}{\sqrt{x}\tan^{-1}\sqrt{x}}$

Answer: A

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89. $\frac{d}{d\theta}\{\sin h[\log \cot(\pi/4+\theta)]\} =$

A. $-\tan 2\theta$

B. $-2\sec^2 2\theta$

C. $2\sec^2 2\theta$

D. none

Answer: B

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90. If $\sin h^{-1}x + \sin h^{-1}y = 1$ then

A. $\frac{dy}{dx} = \sqrt{\left|\frac{1+y^2}{1+x^2}\right|}$

B. $\frac{dy}{dx} + \sqrt{\left|\frac{1+y^2}{1+x^2}\right|}$

C. $\sqrt{1+y^2}y_1 + \sqrt{1+x^2} = 0$

D. none

Answer: B

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91. If $y = \sqrt{\left|\frac{1-\sin^{-1}x}{1+\sin^{-1}x}\right|}$ then $y'(0) =$

A. 0

B. 1

C. -1

D. none

Answer: C

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

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

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

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

D. none

Answer: B

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93. The derivative of $\cos ec^{-1}(a^x) w.r.t$ x is

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

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

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

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

Answer: B

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94. $\frac{d}{dx}\left\{\cot^{-1}\left(\frac{1+x}{1-x}\right)\right\} =$

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

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

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

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

Answer: D

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

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

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

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

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

Answer: A

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96. The deriavative of $\sqrt{\tan^{-1} x}$ w.r.t x is

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

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

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

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

Answer: A

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97. The derivative of $\sqrt{\tan^{-1}(e^x)}$ w.r.t x is

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

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

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

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

Answer: A

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98. The derivative of $\log_{10}\left[\sin^{-1}\left(x^2\right)\right]$ w.r.t x is

A. $\frac{2x}{\log 10 \sin^{-1}x^2\sqrt{1+x^4}}$

B. $\frac{2x}{\log 10 \sin^{-1}x^2\sqrt{1-x^4}}$

C. $-\frac{2x}{\log 10 \sin^{-1}x^2\sqrt{1+x^4}}$

D. $-\frac{2x}{\log 10 \sin^{-1}x^2\sqrt{1-x^4}}$

Answer: B

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99. If $y = \sin^{-1}\left(x^2 - \frac{1}{2}\right)$ then $\frac{dy}{dx} atx = 0$ is

A. 0

B. 1

C. -1

D. 2

Answer: A

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100. $\frac{d}{dx}\left\{\cos^{-1}\left(\frac{a + b\cos x}{a\cos x + b}\right)(a < b) =\right.$

A. $\frac{ab\sec^2 x}{a^2 + b^2\tan^2 x}$

B. $\frac{ab\sec^2 x}{a^2 - b^2\tan^2 x}$

C. $\frac{\sqrt{b^2 - a^2}}{a\cos x + b}$

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

Answer: C

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101. $\frac{d}{dx}\left\{\tan^{-1}\left(\frac{b\tan x}{a}\right)\right\} =$

A. $\frac{ab\sec^2 x}{a^2 + b^2\tan^2 x}$

B. $\frac{ab\sec^2 x}{a^2 - b^2\tan^2 x}$

C. $\frac{\sqrt{b^2 - a^2}}{a\cos x + b}$

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

Answer: A

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102. $\frac{d}{dx}\left\{\tan^{-1}\left(\sqrt{\left|\frac{a-b}{a+b}\right|}\tan\frac{x}{2}\right)\right\} =$

A. $\frac{\sqrt{a^2-b^2}}{2(a+b\cos x)}$

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

C. $\frac{1}{a+b\cos x}$

D. none

Answer: A

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103. $\left\{\tan^{-1}\left(\frac{a+b\cos x}{b+a\cos x}\right)\right\} =$

A. $\frac{(a^2-b^2)\sin x}{(a^2+b^2)(1+\cos^2 x)+4ab\cos x}$

B. $\frac{\sin x}{(a^2+b^2)\cos^2 x}$

C. $\frac{\sin x}{(1+\cos^2 x)+4ab\cos x}$

D. none

Answer: A

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104. $\frac{d}{dx}\left\{\frac{2}{\sqrt{a^2-b^2}}\tan^{-1}\left(\frac{\sqrt{a-b}}{a+b}\frac{\tan(x)}{2}\right)\right\} =$ `

A. $a+b\sin x$

B. $a+b\cos x$

C. $\frac{1}{a+b\sin x}$

D. $\frac{1}{a+b\cos x}$

Answer: D

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105. If $y = Arc\tan\sqrt{\left[\frac{x-a}{b-x}\right]}$ then $\frac{dy}{dx} =$

A. $\frac{1}{2\sqrt{(x+a)(b+x)}}$

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

C. $\frac{1}{2(x+a)(b+x)}$

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

Answer: B

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

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

B. $2\sqrt{a^2-x^2}$

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

D. none

Answer: B

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107. $\frac{d}{dx}\left\{x\sqrt{a^2+x^2}+a^2\sin h^{-1}\left(\frac{x}{a}\right)\right\}=$

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

B. $2\sqrt{a^2-x^2}$

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

D. none

Answer: A

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108. $\frac{d}{dx}\left\{x\sqrt{x^2-a^2}-a^2\cosh^{-1}\left(\frac{x}{a}\right)\right\}=$

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

B. $2\sqrt{a^2-x^2}$

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

D. none

Answer: C

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109. If $y = \log\left\{\left(\frac{1+x}{1-x}\right)^{1/4}\right\} - \frac{1}{2}\tan^{-1}(x)$, then $\frac{dy}{dx} =$

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

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

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

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

Answer: B

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110. $\frac{d}{dx}\left\{\frac{1}{6}\log\frac{(x-1)^2}{x^2+x+1} + \frac{1}{\sqrt{3}}\tan^{-1}\left(\frac{2x+1}{\sqrt{3}}\right)\right\} =$

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

B. $\frac{x}{x^3+1}$

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

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

Answer: B

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111. $\frac{d}{dx}\left[a\tan^{-1}x + b\log\left(\frac{x-1}{x+1}\right)\right] = \frac{1}{x^4-1} \Rightarrow a-2b =$

A. 1

B. -1

C. 0

D. 2

Answer: B

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

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

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

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

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

Answer: D

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EXERCISE 1B

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

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

B. te^1

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

D. $\frac{t\left(e^1-\sin t\right)}{1+t\cos t}$

Answer: A

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2. $f(x)=\left(x^2-1\right)^7 \Rightarrow f^{(14)}(x)=$

A. 0

B. $2!$

C. $7!$

D. $14!$

Answer: D

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3. If $x = ct, y = \frac{c}{t}$ then $\frac{dy}{dx} =$

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

B. te^1

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

D. $\frac{t(e^1 - \sin t)}{1 + t\cos t}$

Answer: C

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

A. x/y

B. y/x

C. $-x/y$

D. $-y/x$

Answer: A

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5. If $x = a\sec\theta, y = b\tan\theta$ then $\frac{dy}{dx} =$

A. $\frac{b}{a}\cos ec\theta$

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

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

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

Answer: A

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6. If $x = a(t + \sin t), y = a(1 - \cos t)$ and $\frac{dy}{dx} = \tan p$ then p =

A. $\frac{2a}{y}$

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

C. $\left(b^2x\right)\frac{)}{a^2y}$

D. t/2

Answer: D

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7. If $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ then $\frac{dy}{dx}=$

A. $\frac{2a}{y}$

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

C. $\frac{b^2x}{a^2y}$

D. $\frac{-b^2x}{a^2t}$

Answer: B

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8. If $ax^2 + 2hxy + by^2 = 0$ then $\frac{dy}{dx} =$

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

B. $\frac{-(ax + hy)}{hx + by}$

C. $\left(\frac{ax + hy + g}{hx + by + f}\right)$

D. $-\left(\frac{dx + hy + g}{hx + by + f}\right)$

Answer: D

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9. If $ax^2 + 2kxy + by^2 + 2gx + 2fy + c = 0$ then $\frac{dy}{dx} =$

A. $\frac{ax + by}{hx + by}$

B. $\frac{-(ax + hy)}{hx + by}$

C. $\left(\frac{ax + hy + g}{hx + by + f}\right)$

D. $-\left(\frac{ax + ky + g}{kx + by + f}\right)$

Answer: A

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10. Find $\frac{dy}{dx}$ if $2x^2 - 3xy + y^2 + x + 2y - 8 = 0$.

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: C

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11. $\sqrt{\frac{y}{x}} + \sqrt{\frac{x}{y}} = 2 \Rightarrow \frac{dy}{dx} =$

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

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

C. 1

D. 2

Answer: B

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12. If $x^3 + y^3 = 3axy$then $\frac{dy}{dx} =$

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

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

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

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

Answer: B

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13. If $x^3 + y^3 = 3axy$ then $\frac{dy}{dx} =$

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

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

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

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

Answer: C

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14. If $xy(x + y) = 2$ then $\frac{dy}{dx} =$

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

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

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

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

Answer: D

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

A. $\frac{\sqrt{y}\left(4x\sqrt{x} - \sqrt{y}\right)}{\sqrt{x}\left(2\sqrt{y} + \sqrt{x}\right)}$

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

C. $\frac{2x + 3}{2y + 5}$

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

Answer: D

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16. If $y = 1 + xe^y$ then $\frac{dy}{dx} =$

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

B. $\frac{e^y}{1-xe^y}$

C. $\frac{e^y}{\sqrt{1+xe^y}}$

D. $\frac{e^y}{\sqrt{1-xe^y}}$

Answer: B

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17. If $\sin^2 mx + \cos^2 ny = a^2$ then $\frac{dy}{dx} =$

A. $\frac{m\sin(2mx)}{n\sin(2ny)}$

B. $\frac{m\cos(2mx)}{n\sin(2ny)}$

C. $\frac{m\cos(2mx)}{n\cos(2ny)}$

D. $\frac{m\sin(2mx)}{n\cos(2ny)}$

Answer: A

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18. If $x^3 - xy^2 + 3y^2 + 2 = 0$ then $\frac{dy}{dx} =$

A. $\frac{3x^2 + y^2}{2xy - 6y}$

B. $\frac{3x^2 - y^2}{2xy + 6y}$

C. $\frac{3x^2 + y^2}{2xy + 6y}$

D. $\frac{3x^2 - y^2}{2xy - 6y}$

Answer: A

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19. If $3x^2 + 4xy + 2y^2 + x - 8 = 0$ then $\left(\frac{dy}{dx}\right)_{-1\ \ 3} =$

A. $3/8$

B. $-5/7$

C. $5/8$

D. $-7/8$

Answer: D

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20. If $xy = (x + y)^n$ and $\frac{dy}{dx} = \frac{y}{x}$ then n =

A. 1

B. 2

C. 3

D. 4

Answer: B

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21. If $y \sin x = x + y$ then $\frac{dy}{dx} atx = 0$ is

A. 1

B. -1

C. 0

D. 2

Answer: B

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

A. 2

B. -2

C. 1

D. -1

Answer: D

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23. If $x^2 - y^2 = a(x - y)$ and $x \neq y$, then $\frac{dy}{dx} =$

A. 0

B. 1

C. -1

D. 2

Answer: C

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24. $x\sqrt{1+y} + y\sqrt{1+x} = 0 \Rightarrow \frac{dy}{dx} =$

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

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

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

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

Answer: B

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25. If $3\sin xy + 4\cos xy = 5$ then $\frac{dy}{dx} =$

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

B. $\frac{3\sin xy + 4\cos xy}{3\cos xy - 4\sin xy}$

C. $\frac{3\cos xy + 4\sin xy}{4\cos xy - 3\sin xy}$

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

Answer: A

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26. If $\sqrt{\tan y} = e^{\cos 2x}\sin x,$ then $\frac{dy}{dx} =$

A. $\sin 2y(\cot x - 2\sin 2x)$

B. $\sin 2x(\cot y - \sin y)$

C. $\sin 2y \sin 2x$

D. $\cos 2y \cos 2x$

Answer: A

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27. $x^2 + y^2 = t + \frac{1}{t}, x^4 + y^4 = t^2 + \frac{1}{t^2} \Rightarrow x^3 y \frac{dy}{dx} =$

A. -1

B. 1

C. 0

D. 1

Answer: A

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28. $\frac{d}{dx}\{x^x\} =$

A. $x^x \log ex$

B. $x^x \log x$

C. $x^x \log_x e$

D. $x^x \log_x x$

Answer: A

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29. $\frac{d}{dx}\left\{x^{1/x}\right\} =$

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

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

C. $1+\log x$

D. $x^{1/x-2}$

Answer: B

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30. The derivative of $(ax+b)^{cx+d}$ w.r.t x is

A. $(ax+b)^{cx+d}\left[\frac{a(cx+d)}{ax+b}+c\log(ax+b)\right]$

B. $(ax-b)^{cx+d}\left[\frac{a(cx+d)}{ax+b}+c\log(ax\pm b)\right]$

C. $(ax-b)^{cx+d}\left[\frac{a(cx+d)}{ax+b}+c\log(ax-b)\right]$

D. $(ax-b)^{cx+d}\left[\frac{a(cx+d)}{ax+b}+c\log(ax+b)\right]$

Answer: A

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31. The derivative of $(\log x)^4$ w.r.t x is

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

B. $(\log x)^x - 1[1 - \log x \log(\log x)]$

C. $-(, ogx)^{x-1}[1 - \log x \log(\log x)]$

D. $-(\log x)^{x-1}[1 - \log x \log(\log x)]$

Answer: A

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32. The derivative of

$(\sin x)^x$ w.r.t is

A. $(\sin x)^x[x \cot x + \log \sin x]$

B. $(\sin x)^x[x \cot x - \log \sin x]$

C. $-(\sin x)^x[x \cot x + \log \sin x]$

D. $-(\sin x)^x[x \cot x - \log \sin x]$

Answer: A

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33. The derivative of x^{x^x} w.r.t x is

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

B. $x^{x^x} x^{(x-1)} [1 + x \log x (1 - \log x)]$

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

D. $x^{x^x} x^{(x-1)} [1 - x \log x (1 - \log x)]$

Answer: C

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34. The derivative of x^{a^x} w.r.t x is

A. $x^{a^x} a^x [1/x + \log a \log x]$

B. $x^{a^x} a^x [1/x - \log a \log x]$

C. $x^{a^x} a^x [x + \log a \log x]$

D. $x^{a^x} a^x [x - \log a \log x]$

Answer: A

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35. The derivative of $x^{\log(\log x)}$ w.r.t x is

A. $x^{\log(\log x)+1}[1+\log(\log x)]$

B. $x^{\log(\log x)+1}[1-\log(\log x)]$

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

D. $x^{\log(\log x)+1}[1+\log(\log x)]$

Answer: C

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36. The derivative of $x^{\sin x}$ w.r.t is

A. $x^{\sin x(-1)}[\sin x + x\cos x \log x]$

B. $x^{\sin x(-1)}[\sin x - x\cos x\log x]$

C. $x^{\sin x(+1)}[\sin x + x\cos x\log x]$

D. $x^{\sin x(+1)}[\sin x - x\cos x\log x]$

Answer: A

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37. The derivative of $(\sin x)^{\cos x}(0 < x < \pi)$ w.r.t is

A. $(\sin x)^{\cot x}[\cos x\cot x + \sin x\log\sin x]$

B. $(\sin x)^{\cot x}[\cos x\cot x - \sin x\log\sin x]$

C. $(\sin x)^{\cos x}[\cos x\cot x + \sin x\log\sin x]$

D. $(\sin x)^{\cos x}[\cos x\cot x - \sin x\log\sin x]$

Answer: D

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38. The derivative of $x^{\log x}$ w.r.t x is

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

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

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

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

Answer: D

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39. If $y = \left(x^2+1\right)^{\sin x}$ then $y'(0) =$

A. $1/2$

B. e^2

C. 0

D. $3/2$

Answer: C

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40. $y = x^{\sin x} + (\sin x)^x$ then $\frac{dy}{dx} =$

A. $x^{\sin x}\left(\frac{\sin x}{x} + \cos x \log x\right) + (\sin x)^x (x \cot x + \log \sin x)$

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

C. $x^{\sin x}(x \cos ec - \cos x \log x) + (\sin x)^x (x \cot x + \log \cos x)$

D. $x^{\sin x}(x \cos x - \sin x \log x) + (\sin x)^x (x \cot x + \log \sin x)$

Answer: A

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41. The derivative of $(\cot x)^{\sin x} + (tnax)^{\cos x}$ w.r.t x is

A.

$$(\cot x)^{\sin x}[\sec x + \cos x \log \cot x] + (\tan x)^{\cos x}[\cos ecx - \sin x \log \tan$$

B.

$$(\cot x)^{\sin x}[- \sec x + \cos x \log \cot x] + (\tan x)^{\cos x}[\cos ecx + \sin x \log$$

C.

$$(\cot x)^{\sin x}[\sec x - \cos x \log \cot x] + (\tan x)^{\cos x}[\cos ecx - \sin x \log \tan$$

D.

$$(\cot x)^{\sin x}[- \sec x + \cos x \log \cot x] + (\tan x)^{\cos x}[\cos ecx - \sin x \log$$

Answer: D

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42. Let y be an implicit functio of x defined by $x^{2x} - 2x^x \cot y - 1 = 0.$

Then $y'(1)$ equals

A. 1

B. $\log 2$

C. $-\log 2$

D. -1

Answer: D

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43. The derivative of $\sin x \sin 2x \sin 3x$ w.r.t x is

A. $\sin x \sin 2x \sin 3x[\cot x + 2\cot 2x + 3\cot 3x]$

B. $\sin x \sin 2x \sin 3x[\cot x + 2\cot 2x - 3\cot 3x]$

C. $\sin x \sin 2x \sin 3x[\cot x - 2\cot 2x + 3\cot 3x]$

D. $\sin x \sin 2x \sin 3x[\cot x - 2\cot 2x - 3\cot 3x]$

Answer: A

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44. If $y = \left\{ \dfrac{(3x-5)^{2/3}(x^2+1)^{3/2}}{(2x+3)^{3/2}(3x^2-1)^{1/3}} \right\}$ then $\dfrac{dy}{dx} =$

A. $y\left[\dfrac{2}{3x-5} + \dfrac{3x}{x^2+1} - \dfrac{3}{2x+3} - \dfrac{2x}{3x^2-1}\right]$

B. $\left[\dfrac{2}{3x-5} + \dfrac{3x}{x^2+1} - \dfrac{5}{2x+3} + \dfrac{2x}{3x^2-1}\right]$

C. $\left[\dfrac{2}{3x-5} - \dfrac{3x}{x^2+1} - \dfrac{5}{2x+3} + \dfrac{2x}{3x^2-1}\right]$

D. $\left[\dfrac{2}{3x-5} + \dfrac{3x}{x^2+1} + \dfrac{5}{2x+3} - \dfrac{2x}{3x^2-1}\right]$

Answer: A

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45. The derivative of $\sin^{-1} 2x\sqrt{1-x^2}$ w.r.t x is

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

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

C. $\dfrac{-3}{\sqrt{1-x^2}}$

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

Answer: B

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46. The derivative of $\cos^{-1}(2x^2 - 1)$ w.r.t x is

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

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

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

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

Answer: A

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47. $\frac{d}{dx}\left\{\cos^{-1}\frac{1-x^2}{1+x^2}\right\} =$

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

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

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

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

Answer: A

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48. If $y = \frac{\sin^{-1}(1-x^2)}{1+x^2}$ then $\frac{dy}{dX} =$

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

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

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

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

Answer: A

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49. $\frac{d}{dx}\{\sin^{-1}(3x - 4x^3)\} =$

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

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

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

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

Answer: C

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50. The derivative of $\cos^{-1}(4x^3 - 3x)$ w.r.t x is

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

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

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

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

Answer: C

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51. $\frac{d}{dx}\left\{\sin^{-1}\left(\frac{5x+12\sqrt{1-x^2}}{12}\right)\right\} =$

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

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

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

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

Answer: A

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52. $\frac{d}{dx}\left\{\tan^{-1}\frac{\sqrt{x}+\sqrt{a}}{1-\sqrt{a}x}\right\} =$

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

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

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

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

Answer: A

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53. $\frac{d}{dx}\left\{\cos^{-1}\frac{x^{2n}-1}{x^{2n}+1}\right\} =$

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

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

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

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

Answer: C

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

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

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

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

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

Answer: B

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55. $\frac{d}{dx}\left\{\sin^2\cot^{-1}\frac{\sqrt{1+x}}{1-x}\right\}=$

A. 0

B. $1/2$

C. $-1/2$

D. -1

Answer: C

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56. $\frac{d}{dx}\left\{\sin^{-1}\left(\frac{3x}{2}-\frac{x^3}{2}\right)\right\}=$

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

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

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

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

Answer: A

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57. $\frac{d}{dx}\left\{\cos^{-1}\left(\frac{4x^3}{27}-x\right)\right\}=$

A. $\frac{3}{\sqrt{9-x^2}}$

B. $\frac{1}{\sqrt{9-x^2}}$

C. $\frac{-3}{\sqrt{9-x^2}}$

D. $\frac{-1}{\sqrt{9-x^2}}$

Answer: C

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58. $\frac{d}{dx}\left\{\cos^{-1}\left(\sqrt{\frac{1+x}{2}}\right)\right\} =$

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

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

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

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

Answer: A

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59. $\frac{d}{dx}\left\{\sin^{-1}\left(\sqrt{\frac{1-x}{2}}\right\}\right. =$

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

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

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

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

Answer: A

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

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

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

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

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

Answer: B

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61. $\frac{d}{dx}\left\{\sin^{-1}\frac{2x}{1+x^2}\right\} =$

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

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

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

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

Answer: C

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62. $\frac{d}{dx}\left\{\tan^{-1}\frac{2x}{1-x^2}\right\} =$

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

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

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

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

Answer: C

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63. $\frac{d}{dx}\left\{\sec^{-1}\frac{1}{1-2x^2}\right\} =$

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

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

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

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

Answer: D

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

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

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

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

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

Answer: D

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65. $\frac{d}{dx}\left\{\tan^{-1}\left(\frac{x-a}{1+ax}\right)\right\} =$

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

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

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

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

Answer: B

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

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

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

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

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

Answer: A

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67. $\tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right) =$

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

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

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

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

Answer: C

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68. $\frac{d}{dx}\left\{\tan^{-1}\frac{\sqrt{1-x}}{1+x}\right\} =$

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

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

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

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

Answer: B

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

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

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

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

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

Answer: D

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

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

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

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

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

Answer: D

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

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

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

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

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

Answer: D

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72. $\frac{d}{dx}\left\{\tan^{-1}\left(\frac{x-x^{1/2}}{1+x^{3/2}}\right)\right\} =$

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

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

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

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

Answer: A

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73. $\frac{d}{dx}\left\{\tan^{-1}\frac{\sqrt{1+x^2}+\sqrt{1-x^2}}{\sqrt{1+x^2}-\sqrt{1-x^2}}\right\}=$

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

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

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

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

Answer: B

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74. The derivative of $\tan^{-1}\frac{2x}{1-x^2}$ w.r.t $\cos^{-1}\frac{1-x^2}{1+x^2}$ is

A. 0

B. 1

C. 2

D. 3

Answer: B

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75. The derivative of $Arc\tan\frac{2x}{1-x^2} w.r.t. Arc\sin\frac{2x}{1+x^2}$ is

A. 0

B. 1

C. 2

D. 3

Answer: B

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76. The derivative of $\tan^{-1}\frac{\sqrt{1+x^2}-1}{x}$ w.r.t.$\tan^{-1}x$ is

A. 0

B. 1

C. 2

D. $+1/2$

Answer: D

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77. The derivative of $\cos^{-1}\frac{1-x^2}{1+x^2}w.\ r.\ t.\ \tan^{-1}\frac{2x}{1-x^2}$ is

A. 0

B. 1

C. 2

D. $1/2$

Answer: B

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78. The derivative of $\sin^{-1}\frac{2x}{1+x^2} w.r.t \tan^{-1}\frac{2x}{1-x^2}$ is

A. 0

B. 1

C. -1

D. 2

Answer: B

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

A. 2

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

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

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

Answer: A

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80. The derivative of $\sec^{-1}\frac{1}{2x^2-1} w.\ r.\ t.\ \sqrt{1+3x} at x = -\frac{1}{3}$ is

A. 0

B. 1

C. $1/2$

D. $-2/3$

Answer: A

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81. The derivative of $\tan^{-1}\frac{\sqrt{1+x^2}-1}{x} w.r.t. \tan^{-1}\frac{2x\sqrt{1-x^2}}{1-2x^2} atx = 0$ is

A. 1

B. $1/2$

C. $1/4$

D. $1/8$

Answer: D

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82. The derivative of $\sin^{-1}\left(3x - 4x^3\right) w.\ r.\ t.\ \tan^{-1}\dfrac{x}{\sqrt{1-x^2}}$ is

A. 0

B. 1

C. 2

D. 3

Answer: D

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83. If $y = \sqrt{\sin x + y}$ then $\dfrac{dy}{dx} =$

A. $\dfrac{\cos x}{y-1}$

B. $\dfrac{\cos y}{x-1}$

C. $\dfrac{\cos x}{2y-1}$

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

Answer: C

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84. If $y = \sqrt{\cos x + y}$ thnd $\frac{dy}{dx} =$

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

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

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

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

Answer: B

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

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

B. $\frac{\sin^2(\alpha+y)}{\sin\alpha}$

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

D. $\frac{\sin^2(\alpha-y)}{\sin\alpha}$

Answer: B

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

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

B. $\frac{\cos^2(a-y)}{\sin a}$

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

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

Answer: D

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87. If $\cos^{-1}\left(\frac{x^2-y^2}{x^2+y^2}\right) = k$ (a constnat), then $\frac{dy}{dx} =$

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

A. $\frac{\sqrt{1+y2}}{\sqrt{1+x^2}}$

B. $\frac{\sqrt{1+x2}}{\sqrt{1+y^2}}$

C. 0

D. 1

Answer: A

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

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

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

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

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

Answer: D

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90. If $y=x^y$ then $\frac{dy}{dx}=$

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

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

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

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

Answer: B

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

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

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

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

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

Answer: A

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92. If $x^y = \log x$ then $\frac{dy}{dx} atx = e$ is

A. 0

B. 1

C. e

D. $1/e$

Answer: C

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93. $x^y = y^x \Rightarrow x(x - y\log x)\frac{dy}{dx} =$

A. $y(y - x\log y)$

B. $y(y + x\log y)$

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

D. $x(y - x\log y)$

Answer: A

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94. $\frac{d}{dx}\left\{e^{x^e}+x^{e^x}+e^{x^x}\right\}=$

A. $e^{x^e}+x^{e^x}+e^{x^x}$

B. $x^2e^{x^e}+e^xx^{e^x}+x^x+e^{x^x}$

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

D. none

Answer: D

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

A. $\frac{\log\sin y+y\tan x}{\log\cos x-x\cot y}$

B. $\frac{\log \sin y - y \tan x}{\log \cos x + \cot y}$

C. $\frac{\log \sin y}{\log \cos x}$

D. $\frac{\log \cos x}{\log \sin y}$

Answer: A

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96. If $y = \sqrt{x + \sqrt{x + \sqrt{x + \ldots . \infty}}}$ then $\frac{dy}{dx} =$

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

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

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

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

Answer: D

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97. If $y = \sqrt{\tan x + \sqrt{\tan x + \sqrt{\tan + ... \infty}}}$ then $\frac{dy}{dx} =$

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

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

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

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

Answer: B

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98. If $y = \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x + ... \infty}}}$ then $\frac{dy}{dx}$

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

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

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

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

Answer: C

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99. If $y = x^{x^{x^{\cdots \cdots \cdot \infty}}}$ then $\frac{dy}{dx} =$

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

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

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

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

Answer: B

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100. If $y = (\sin x)^{(\sin x)^{(\sin x)^{\cdots \infty}}}$, then $\frac{dy}{dx} =$

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

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

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

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

Answer: C

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

A. y

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

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

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

Answer: D

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102. If $x = e^{y+e^{y+\ldots 10\infty}}, x > 0,$ then $\frac{dy}{dx}$ is

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

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

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

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

Answer: C

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103. If $y = x + \frac{1}{x + \frac{1}{x+\ldots\infty}}$ then $\frac{dy}{dx}$ =`

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

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

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

D. y

Answer: A

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104. If $y = \sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\cdots\infty}}}$, then $\frac{dy}{dx} =$

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

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

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

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

Answer: D

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105. If $y = a^{x^{a^{x^{a^{x}\cdots\infty}}}}$ then $\frac{dy}{dx}$=`

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

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

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

D. none

Answer: A

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106. If y = x ^(2) + (1)/(x ^(2) + (1)/(x ^(2) +...oo)),$then$(dy)/(dx) =`

A. $\frac{2xy^2}{y^2+1}$

B. $\frac{2xy}{y^2+1}$

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

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

Answer: A

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107. If $x < 1$, then $\frac{1}{x+1} + \frac{2x}{1+x^2} + \frac{4x^3}{1+x^4} + \ldots. \infty =$

A. x

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

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

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

Answer: C

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108. If < 1 then $\frac{1-2x}{1-xx^2} + \frac{2x-4x^3}{1-x^2+x^4} + \frac{4x^3-8x^7}{10x^4+x^8} + \ldots \infty =$

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

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

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

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

Answer: A

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109. If $f(x) = x^2 + \frac{x^2}{(1+x^2)} + \frac{x^2}{(1+x^2)} + \ldots + \left(x^2\left((1+x^2\right) + \ldots$

then $x = 0$

A. $f(x)$ has no limit

B. $f(x)$ is discotinous

C. $f(x)$ is continous but not differentiable

D. $f(x)$ is differentiable

Answer: B

View Text Solution

110.

$f(x) = (\cos x)(\cos 2x)\ldots(\cos nx) \Rightarrow f'(x) + \sum^{n} (r \tan rx) f(x) =$

A. $f(x)$

B. 0

C. $-f(x)$

D. $2f(x)$

Answer: B

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111. If $y = \left\{\sin\frac{x}{2}\sin\frac{x^2}{2^2}.\sin\frac{x^3}{2^3}.....\sin\frac{x^n}{2^n}\right\}$ then $\frac{dy}{dx} =$

A. $y\left(\frac{1}{2}\right)\tan\frac{x}{2} + \tan\frac{x^2}{2^2} + ... + \frac{nx^{n-1}}{x^n}\tan\frac{x^n}{2^n}$

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

C. $y\left\{\left(\frac{1}{2}\right)\cot\frac{x}{2} + \left(\frac{x}{2}\right)\cot\frac{x^2}{2^2} + ... + \left(\frac{nx^{n-1}}{2^n}\right)\cot\frac{x^n}{2^n}\right\}$

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

Answer: C

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112. If $\cos\frac{x}{2}\cos\frac{x}{2^2}\ldots\cos\frac{x}{2^n}=\frac{\sin x}{2^n\sin(x/2^n)}$ then $\left(\frac{1}{2^2}\right)\sec^2\frac{x}{2}+\left(\frac{1}{2^4}\right)ec^2\frac{x}{2^2}\ldots\left(\frac{1}{2^{2n}}\right)\sec^2\frac{x}{2^n}=$

A. $\left(\frac{1}{2^{2n}}\right)coec^2\frac{x}{2^n}+\cos ec^2x2$

B. $-\left(\frac{1}{2^{2n}}\right)coec^2\frac{x}{2^n}+\cos ec^2x2$

C. $\cos ec^2\frac{x}{2^n}+\cos ec^2x$

D. none

Answer: B

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113. If $\sin\theta\sin(2\alpha+\theta)\sin(4\alpha+\theta)\ldots\sin(2(n-1)\alpha+\theta)=\frac{\sin n\theta}{2^{n-1}}$ where $2n\alpha=\pi$ then $\cot(\theta)+\cot(2\alpha+\theta)+\cot(4\alpha+\theta)+\ldots\ldots+\cot(2n-1)\alpha+\theta)=$

A. $2^n\cot n\theta$

B. $4^n \tan n\theta$

C. $3 \cot n\theta$

D. none

Answer: C

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114. If

$$Y = \tan^{-1}\left(\frac{1}{1+x+x^2}\right) + \tan^{-1}\left(\frac{1}{x^2+3x+3}\right) + \tan^{-1}\left(\frac{1}{x^2+5x+}\right.$$

upto n term then $y^1(0)$ =

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

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

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

D. none

Answer: C

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EXERCISE 1C

1. The function $y = \sin^{-1}(\cos x)$ is not differentiable at

A. $x = \pi$

B. $x = \pi/2$

C. $x = 0$

D. $x = \pi/4$

Answer: A

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2. The function $f(x) = \sin^{-1}(\tan x)$ is not differentiable at

A. $x = 0$

B. $x = -\pi/6$

C. $x = \pi/6$

D. $x = \pi/4$

Answer: D

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3. The set of all points where at tunction $f(x) = \sqrt{1 - e^{-x}}$ is differentiable is

A. $(0, \infty)$

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

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

D. $(-\infty, 0)$

Answer: C

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EXERCISE 1D

1. $y = \sin^{-1} x \Rightarrow (1 - x^2)\frac{d^2y}{dx^2} =$

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

B. 0

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

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

Answer: C

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

A. 6

B. 24

C. 3

D. 0

Answer: B

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3. $y = \sin\left(m \sin^{-1} x\right) \Rightarrow \left(1 - x^2\right) y_2 - x y_1 =$

A. $m^2 y$

B. $-m^2 y$

C. $2m^2 y$

D. $-2m^2 y$

Answer: B

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4. If $y = \sin\left(7\sin^{-1}x\right)$ then $\left(1-x^2\right)y_2 - xy_1 =$

A. $-49y$

B. $-7y$

C. $49y$

D. $7y$

Answer: A

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

A. 0

B. $\sin x$

C. $\cos x$

D. -1

Answer: A

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6. If $y = x^{n-1}\log x,$ then $xy_1 =$

A. $(n-1)y + x^{n-1}$

B. -1

C. 1

D. none

Answer: A

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7. If $y = \log\sin x$ then $y_2 =$

A. $\frac{1}{\cos ecx}$

B. $-\cos ecx \cot x$

C. $-\cos ec^2 x$

D. $\cos ec^2 x$

Answer: C

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8. If $y = \frac{\log x}{x}$ then $y_1(1) =$

A. -3

B. 1

C. 0

D. 3

Answer: B

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

A. $-m^2y$

B. m^2y

C. my^2

D. my

Answer: A

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10. If $y = \left(1 + x^2\right)\tan^{-1} x$ then $y_2 =$

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

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

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

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

Answer: A

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11. If $y = e^{-x}\cos x$ then $y_4 =$

A. y

B. 2y

C. 4y

D. $-4y$

Answer: D

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12. If $y = \frac{5x+7}{2x-3}$ then $y_2 =$

A. $\frac{44}{(2x+1)^3}$

B. $\frac{-44}{(2x+1)^3}$

C. $\frac{116}{(2x-3)^3}$

D. $\frac{-116}{(2x-3)^2}$

Answer: C

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13. If $y = \frac{ax+b}{cx+d}$ then $2y_1y_3 =$

A. y_2

B. y_2^2

C. $3y_2^2$

D. $4y_2^2$

Answer: C

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14. If $y = e^{\sqrt{x}} + e^{-\sqrt{x}}$ then $xy'' + y'/2 =$

A. y

B. 4y

C. $y/2$

D. $y/4$

Answer: D

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15. If $y = \log\left(x + \sqrt{x^2 + 1}\right)$ then $y_2(1) =$

A. 0

B. 1

C. $-12/\sqrt{2}$

D. $-1/2\sqrt{2}$

Answer: D

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16. If $y = \log\left(x + \sqrt{x^2 - 1}\right)$ then, $y_2\left(\sqrt{2}\right) =$

A. $-\sqrt{2}$

B. $1/2$

C. $\sqrt{2}$

D. none

Answer: A

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17. If $\frac{1}{1 + x + x^2 + x^3}$ then $y_2(0) =$

A. 1

B. -1

C. $1/2$

D. 0

Answer: D

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18. If $f(x)\frac{x^3}{x^2-1}$ then $f''(0) =$

A. 1

B. $-2!$

C. 0

D. $2!$

Answer: C

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19. If $y = a + bx^2$, a, b arbitary constnats, then

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

B. $x\frac{d^2y}{dx^2} = y_1$

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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20. If $y = \sqrt{\cos 2x}$ then $y\frac{d^2y}{dx^2} + 2y^2 =$

A. 0

B. $-\left(\frac{dx}{dx}\right)^2$

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

D. $y\frac{dy}{dx}$

Answer: B

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21. If $y = \sqrt{\sec 2x}$ then $y_2 =$

A. $3y^5 - y$

B. $3y - y$

C. y

D. none

Answer: A

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22. If $f(x) = \frac{x^2}{a + x} then f''(a) =$

A. $4a$

B. $1/8a$

C. $1/4a$

D. 8a

Answer: C

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23. If $y = \sqrt{ax} + \frac{a^2}{\sqrt{ax}} then y_1, y_2$ at $x = a$ are

A. $0, 1/2a$

B. $1, 1$

C. $0, 1$

D. $0, 0$

Answer: A

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24. If $y = a\cos 2x + b\sin 2x$ then $y_2 + 4y =$

A. 2

B. 1

C. 0

D. none

Answer: C

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25. If $y = 3^x, then \frac{d^2y}{dx^2} =$

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

B. 1

C. $\log 3$

D. $y(\log 3)^2$

Answer: D

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26. If $y = xe^{-x} then y_2 + 2y_1 + y =$

A. 0

B. 1

C. 2

D. none

Answer: A

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27. If $y = x^2 \cos 3x then y_2 at x = 0$ is

A. 0

B. 1

C. 2

D. none

Answer: C

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28. If $x = e^{2t} \cos, 3t,$ then $\frac{d^2x}{dt^2} att = \pi / 2$ is

A. $12e^{\pi}$

B. $-12e^{\pi}$

C. $6e^{\pi}$

D. .

Answer: A

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29. Show that $y = x + \tan x$ satisfies the equation $\cos^2 x \frac{dy^2}{dx^2} + 2x = 2y.$

A. 2y

B. y

C. 0

D. 1

Answer: A

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30. If $y = \sin(\sin x)$ then $y_2 + (\tan x)y_1 + y(\cos^2 x) =$

A. 0

B. 1

C. 2

D. none

Answer: A

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31. If y_k is the kth derivative of y with respect to x, $y = \cos(\sin x)$ then $y_1 \sin x + y_2 \cos x =$

A. $y \sin^3 x$

B. $-y \sin^3 x$

C. $y \cos^3 x$

D. $-y \cos^3 x$

Answer: D

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32. If $y = ax^2 + b/x$ then $x^2 y_2 =$

A. y

B. 2y

C. 1

D. 0

Answer: B

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33. If $y = ax^4 + \frac{b}{x^3}$, then $\frac{d^2y}{dx^2} =$

A. $12x^2/y$

B. $12y/x^2$

C. $12x^2 y$

D. none

Answer: B

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34. If $y = a\cos x + (b + 2x)\sin x$ then $y_2 + y =$

A. $4\cos x$

B. $\cos x$

C. x

D. none

Answer: A

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35. If $y = a + be^{-4x}$ then $y_2 + 4y_1 =$

A. 0

B. 1

C. 2

D. 3

Answer: A

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36. If $y = ax + b/x$ then $x^2 y_2 + x y_1 - y =$

A. 1

B. 0

C. 2

D. none

Answer: B

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37. If $xy = ae^{x} + be^{-x}$ then $xy_2 + 2y_1 - xy =$

A. 0

B. y

C. a

D. none

Answer: A

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38. If $y = \left(x + \sqrt{x^2 - 1}\right)^{m}$ then $\left(x^2 - 1\right)y_2 + xy_1 =$

A. 1

B. $m^2 y$

C. m^2

D. y

Answer: B

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39. If $y = xe^{-1/x}$ then $x^3 y_2 - xy_1 + y =$

A. 1

B. 0

C. 2

D. -1

Answer: B

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40. If $y = e^{\sin^{-1} x}$ then $\left(1 - x^2\right) y_2 - xy_1 - y =$

A. 0

B. 1

C. 2

D. none

Answer: A

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41. If $y = \sin(\log_e x)$ then $\left(x^2 \frac{d^2y}{dx^2} + x\frac{dy}{dx} =\right.$

A. $\sin(\log_e x)$

B. $\cos(\log_e x)$

C. y^2

D. $-y$

Answer: D

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42. If $y = a\cos(\log x) + b\sin(\log x)$ then $x^2 y_2 + x y_1 + y =$

A. 0

B. 1

C. 2

D. none

Answer: A

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43. $\cos^{-1}\left(\frac{y}{b}\right) = 2\log\left(\frac{x}{2}\right), x > 0 \Rightarrow x^2\frac{a^2 y}{dx^2} + x\frac{dy}{dx} =$

A. 4y

B. $-4y$

C. 0

D. $-8y$

Answer: B

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44. If $y\sqrt{1+x^2} = \log\left(x+\sqrt{1+x^2}\right)$ then $\left(1+x^2\right)y_1 + xy =$

A. 1

B. 0

C. 2

D. -1

Answer: A

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45. If $y = ae^{-bx}\cos(cx+d)$ then $y_2 + 2by_1 + \left(b^2+c^2\right)y =$

A. 1

B. 0

C. 2

D. -1

Answer: B

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46. If $y = ax^{n+1} + bx^{-n}$ then $x^2 y_2 =$

A. $n(n+1)y$

B. n

C. $n(n+1)$

D. 1

Answer: A

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47. If $y = ae^{nx} + be^{-nx}$ then $y_2 =$

A. n^2

B. n

C. $n^2 y$

D. none

Answer: C

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48. If $y = e^{-kx/2}(a\cos nx + b\sin nx)$ then $y_2 + ky_1 + \left(n^2 + k^2/4\right)y =$

A. 0

B. 1

C. 2

D. none

Answer: A

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49. If $y = a\cos(\sin x) + b\sin(\sin x)$ then $y_2 + (\tan x)y_1 =$

A. $-y\cos^2 x$

B. $\cos x$

C. $y\cos x$

D. none

Answer: A

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50. $f(x) = 10\cos x + (13 + 2x)\sin x \Rightarrow f''(x) + f(x) =$

A. $\cos x$

B. $4\cos x$

C. $\sin x$

D. $4\sin x$

Answer: B

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51. If $ay^4 = (x+b)^5$ then $5yy_2 =$

A. y_1^2

B. y^2

C. y_1

D. y

Answer: A

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52. If $ax^2 + by^2 = c,$ then $y_2 =$

A. a

B. $\frac{-ac}{b^2y^3}$

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

D. 0

Answer: B

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53. If $x^2 + xy + y^2 = a^2,$ then $y_2 =$

A. $\frac{-6a^2}{(a+2y)^2}$

B. -6

C. 6

D. none

Answer: A

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54. If $x^3 + y^3 = 3axy$ then $y_2 =$

A. $\frac{-2a^2xy}{(y^2 - ax)^3}$

B. $-2a^3$

C. -2

D. none

Answer: A

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55. If $y^2 = (x - a)(x - b)$ then $\frac{d^3}{dx^3}\left[\left(\frac{d^2y}{\left(dx^2\right)^{-2/3}}\right)\right] =$

A. 0

B. 1

C. 2

D. -1

Answer: A

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56. If $x^3 + y^3 = 3ax^2$ then $y_2 =$

A. $\frac{-2a^2x^2}{y^5}$

B. $\frac{4a^2x^2}{y^5}$

C. y^5

D. 1

Answer: A

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57. If $y^2 = a^2 \cos^2 x + bb^2 \sin^2 x$ then $y + y_2 =$

A. a^2b^2

B. $\frac{a^2b^2}{y^3}$

C. y^3

D. none

Answer: B

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58. If $ax^2 + 2hxy + by^2 = 1$ then $(hx + by)^3 y_2 =$

A. 0

B. 1

C. $h^2 - ab$

D. $ab - h^2$

Answer: C

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59. If $x^3 - 3ax^2 + y^3 = 0$then $y^5 y_2 =$

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

B. $2a^2x^2$

C. a^2x^2

D. $-a^2x^2$

Answer: A

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60. If $x^2 + y^2 = a^2 then \frac{\left(1 + y_1^2\right)^{3/2}}{|y_2|} =$

A. a^2

B. a

C. $1/a$

D. none

Answer: B

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61. If $y^2 = 4ax$ then $4a^2\left(1 + y_1^2\right)^{3/2} + \left(y^2 + 4a^2\right)^{3/2} y_2 =$

A. 0

B. 1

C. -1

D. none

Answer: A

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62. If $x^2 + 5xy + y^2 = -2x + y - 6 = 0$ then $y''at(1, 1)$ is

A. $\frac{3}{64}$

B. $\frac{110}{256}$

C. $\frac{111}{128}$

D. none

Answer: A

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63. If $\sqrt{x} + \sqrt{y} = \sqrt{a}$ then $y_2 + (1 + y_1)^3 y =$

A. $1/2a$

B. $1/2$

C. $1/a$

D. $-1/2a$

Answer: A

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64. If $y = \sin(x + y)$ then $y_2 + (1 + y_1)^3 y =$

A. 0

B. 1

C. -1

D. $\cos(x + y)$

Answer: A

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65. If $x^2 - xy + y^2 = 1$ and $y''(1) =$

A. -6

B. $2/3$

C. $3/2$

D. $-2/3$

Answer: A

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66. If $x^2 - 2x^2y^2 + 5x + y - 5 = 0$ and $y(1)$ then $y''(1) =$

A. $-8\frac{22}{27}$

B. $-7\frac{21}{28}$

C. $\frac{22}{7}$

D. 8

Answer: A

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67. If $x = t^2, y = t^3$ then $\frac{d^2y}{dx^2} =$

A. $3/2$

B. $1/4t$

C. $3/2t$

D. $3t/2$

Answer: B

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68. If $x = \left(\frac{2}{t^2}\right), y = t^3 - 1,$ then $\frac{d^2y}{dx^2} =$

A. $15t^2$

B. $\frac{15}{16t^2}$

C. $\frac{15t^7}{16}$

D. $16t^2$

Answer: C

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69. If $x = a\cos^3\theta, y = a\sin^3\theta then \frac{d^2y}{dx^2} at\theta = \pi/4$ is

A. $\frac{3a}{4\sqrt{2}}$

B. $\frac{1}{12\sqrt{2a}}$

C. $\frac{4\sqrt{2}}{3a}$

D. $\frac{-4\sqrt{2}}{3a}$

Answer: C

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

A. $\frac{\cos ec^3\theta}{\theta}$

B. $\frac{\sec^3\theta}{\theta}$

C. $\frac{\tan^3\theta}{\theta}$

D. $\frac{\cot^3\theta}{\theta}$

Answer: B

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71. If $x = a(\theta + \sin\theta), y = a(1 - \cos thea) then \frac{d^2y}{dx^2} at\theta = \frac{\pi}{4}$ is

A. $\frac{\cos ec^3\theta}{\theta}$

B. 2

C. $-2\sqrt{2}$

D. $\frac{2\left(3 - 2\sqrt{2}\right)}{a}$

Answer: D

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72. If $x = a(\theta - \sin\theta), y = a(1 - \cos\theta) then y_2 at \theta = \pi/4$ is

A. $\frac{2\left(3 + 2\sqrt{2}\right)}{b}$

B. $\frac{-2\left(3 + 2\sqrt{2}\right)}{a}$

C. 0

D. 1

Answer: B

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73. $x = \cos\theta, y = \sin 5\theta \Rightarrow \left(1 - x^2\right)\frac{d^2y}{dx^2} - x\frac{dy}{dx} =$

A. $-5y$

B. $5y$

C. $25y$

D. $-25y$

Answer: D

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74. If $y = \frac{lot_e x}{x}$ and $z = \log_e x$, then $\frac{d^2y}{dz^2} + \frac{dy}{dz} =$

A. e^{-z}

B. $2e^{-z}$

C. ze^{-z}

D. $-e^{-z}$

Answer: D

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75. If $x = \sin^{-1} t, y = \sqrt{1-t^2}$ then $\frac{d^2y}{dx^2} =$

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

B. -1

C. t^2

D. none

Answer: A

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76. If $y = \left(\frac{1}{x}\right)^x then y_1(1) =$

A. 1

B. -1

C. 0

D. none

Answer: C

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77. If $f(x) = \left(\frac{1}{x}\right)^x then f''\left(\frac{1}{e}\right) =$

A. negative number

B. 0

C. positive number

D. none

Answer: A

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

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

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

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

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

Answer: B

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

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

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

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

D. none

Answer: C

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80. Let $f(x)$ be a polynonial of degree 4 with $f(2) = -1, f'(2) = 0 -, f''(2) = 2, f''(2) = -12, f''(2) = 24$ then $f''(1) =$

A. 26

B. 13

C. 29

D. 62

Answer: A

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81. Let f be a twice differentiable functin such that $f''(x) - f(x)$ and $f''(x) - g(x) I f h(x) = [f(x)]^2 + [g(x)]^2, h(1) = 8$ then $h(2) =$

A. 1

B. 2

C. 3

D. 8

Answer: D

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82. If $f: R \to R$ is an even function having derivatives of all orders, then an odd function among the following is

A. f''

B. f'''

C. $f' + f''$

D. $f'' + f'''$

Answer: B

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83. If $f: \mathbb{R} \to R$ is an even function which is twice differentiable on $\mathbb{R}$ and $f''(\pi) = 1.$, then $f''(-\pi) =$

A. -1

B. 0

C. 1

D. 2

Answer: C

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84. Let f(x) be a twice differentiable function and $f^{11}(0) = 2$, then $\lim_{x \to 0} \frac{2f(x) - 3f(2x) + f(4x)}{x^2}$ is

A. a

B. 2a

C. 3a

D. 4a

Answer: C

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85. If P (x) is a polynomial of 2nd degree and $P(2) = -1, P'(2) = 0$ and $p''(2) = 2$ then $P'(1) =$

A. 0

B. 1

C. 2

D. -2

Answer: D

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86. If $P(x)$ is polynomial of 3rd degree and $P''(1) = 0, P'''(1) = 6$ then $P''(0) =$

A. 0

B. 6

C. -6

D. none

Answer: C

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87. If $f(x) = u/v$ then $f''(x) =$

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

B. $\frac{1}{v^3}\begin{vmatrix} v & 0 & u \\ v_1 & v & u_1 \\ v_2 & 2v_1 & u_2 \end{vmatrix}$

C. v^3

D. none

Answer: B

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88. If $f(x) = x^n then \sum_{r=0}^{n} \frac{f^{(r)}(1)}{r1} =$

A. 0

B. 2

C. 2n

D. 2^n

Answer: D

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89. The nth derivative of $\log(ax + b)$ is

A. $\frac{(1-)^{n-1}(n-1)!a^n}{(ax+b)^n}$

B. $\frac{(-1)^n n!a^n}{(ax+b)^n}$

C. $\frac{(-1)^{n-1}(n-1)!a^{n-1}}{(ax+b)^n}$

D. none

Answer: A

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90. $f(x)=\sin x+\cos x \Rightarrow f\left(\frac{\pi}{4}\right)f^{(iv)}\left(\frac{\pi}{4}\right)=$

A. 1

B. 2

C. 3

D. 4

Answer: B

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91. The nth derivative of $\cos^4 x$ is

A. $2^{n-1}\cos\left(2x+\frac{n\pi}{2}\right)+2^{2n-3}\cos\left(4x+\frac{n\pi}{2}\right)$

B. $2^{n}\cos\left(2x+\frac{n\pi}{2}\right)+2^{2n-2}\cos\left(4x+\frac{n\pi}{2}\right)$

C. $2^{n+1}\cos\left(2x+\frac{n\pi}{2}\right)+2^{2n-3}\cos\left(4x+\frac{n\pi}{2}\right)$

D. none

Answer: A

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92. $\frac{d^{20}}{dx^{20}}[2\cos x\cos 3x]=$

A. $2^{20}\left(\cos 2x-2^{20}\cos 4x\right)$

B. $2^{20}\left(\cos 2x+2^{20}\cos 4x\right)$

C. $2^{20}\left(\sin 2x+2^{20}\sin 4x\right)$

D. $2^{20}\left(\sin 2x - 2^{20}\sin 4x\right)$

Answer: B

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SET-2

1.

1. if $F(X) = \frac{1}{x} then f'(1) = A$ 2. $If f(x) = \frac{x+1}{x+3} then f'(-1) = B$
3. $If f(x) = x^2 then f'(1) = C$ 4. $If f(x) = \log x then f'(3) = D$

The ascending order of A,B,C ,D is

A. B,A,C,D

B. B,D,A,C

C. A,D,B,C

D. A,B,C,D

Answer: C

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2.

1. $IFf(x) = x^x then f'(e) = A$
2. $Iff(x) = \sin^{-1} x then f'(1/2) =$
3. $Iff(x) = \tan^{-1} x then f'(0) = C$
4. $Iff(x) = e^x then f'(e) = D$

The ascending order of A,B,C,D is

A. C,B,D,A

B. B,C,D,A

C. A,B,C,D

D. D,C,B,A

Answer: A

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3. 1 $\frac{d}{dx}\left(\cos^{-1} x + \sin^{-1} x\right) = A$

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

2 If $f(x) = \left(x + \sqrt{x^2+1}\right)$ then $f'(1) = C$

4 If $f(x) = \cos^{-1}\left(4x^3 - 3x\right)$ then $f'(0) = D$

The ascending order A,B,C,D is

A. D,A,C,B

B. A,B,C,D

C. A,D,C,B

D. B,C,A,D

Answer: D

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4. 1. If $x = at^2, y = 2at$ then $\frac{dy}{dx}att = 1$ is A

2 If $x = \cos\theta, y = \sin\theta$ then $\frac{dy}{dx}at\theta = \frac{\pi}{4}isB$

3 If $x = 1 - \cos\theta, y = \sin\theta,$ then $\frac{dy}{dx}at\theta = \frac{\pi}{6}isC$

4 If $x = \log\sin\theta, y = \tan\theta$ then $\frac{dy}{dx}at\theta = \frac{\pi}{4}$ is D.

The ascending order of A,B,C,D is

A. A,B,C,D

B. A,B,D,C

C. B,A,D,C

D. D,C,B,A

Answer: C

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SET-3

1. Match the following

I. $\frac{d}{dx}\left\{x\sqrt{a^2-x^2}+a^2\,Sin^{-1}\left(\frac{x}{a}\right)\right\}=$ a) $2\sqrt{a^2+x^2}$

II. $\frac{d}{dx}\left\{x\sqrt{a^2+x^2}+a^2\,Sinh^{-1}\left(\frac{x}{a}\right)\right\}=$ b) $2\sqrt{x^2-a^2}$

III. $\frac{d}{dx}\left\{x\sqrt{x^2-a^2}-a^2\,Cosh^{-1}\left(\frac{x}{a}\right)\right\}=$ c) $2\sqrt{a^2-x^2}$

A. a,b,c

B. c,a,b

C. b,c,a

D. a,c,b

Answer: B

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2. Match the following

I. If $x = a(\theta - \sin\theta), y = a(1 - \cos\theta)$ then $\frac{dy}{dx} =$ a) $\tan\theta$

II. If $x = 3\cos\theta - 2\cos^3\theta, y = 3\sin\theta - 2\sin^3\theta$ then $\frac{dy}{dx} =$ b) $\cot\theta$

III. If $x = 3\cos\theta - \cos^3\theta, y = 3\sin\theta - \sin^3\theta$ then $\frac{dy}{dx} =$ c) $\cot\frac{\theta}{2}$

IV. If $x = a(\cos\theta + \theta\sin\theta), y = a(\sin\theta - \theta\cos\theta)$ then $dy/dx =$ d) $-\cot^3\theta$

A. a,b,c,d

B. c,d,b,a

C. c,b,d,a

D. b,a,d,c

Answer: C

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3. Match the following

I. If $x^2+y^2+3xy=7$ then $\frac{dy}{dx}=$	a) $\frac{-(2x+3y)}{3x+2y}$
II. If $x^{2/3}+y^{2/3}=a^{2/3}$ then $\frac{dy}{dx}=$	b) $-\left(\frac{y}{x}\right)^{1/3}$
III. If $x^3+y^3=3axy$ then $\frac{dy}{dx}=$	c) $\frac{x^2-ay}{ax-y^2}$
IV. If $xy(x+y)=2$ then $\frac{dy}{dx}=$	d) $\frac{-y(2x+y)}{x(x+2y)}$

A. a,b,c,d

B. c,d,b,a

C. c,b,d,a

D. b,a,d,c

Answer: A

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4. Match the following

I. $\frac{d}{dx}(Cot^{-1}(cosec\, x + \cot x))$

II. $\frac{d}{dx}\left(\frac{(3-x)\sqrt{x}}{1-3x}\right)$

III. $\frac{d}{dx}\left(1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \ldots \infty\right) =$

IV. $\frac{d}{dx}\left(Sin^{-1}\left(\frac{1-x^2}{1+x^2}\right)\right) =$

a) e^x

b) $\frac{1}{2}$

c) $\frac{3}{2\sqrt{x}\,(1+x)}$

d) $\frac{3}{\sqrt{x} + x\sqrt{x}}$

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

A. b,c,a,e

B. b,c,d,e

C. b,a,c,d

D. d,c,a,e

Answer: A

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5. Match the following

I. If $Sin^{-1}x + Sin^{-1}y = \pi/2$ then dy/dx	a) $-1/x^2$
II. $Tan^{-1}x + Tan^{-1}y = \pi/2$ then dy/dx	b) $-x/y$
III. If $x^m y^n = (x-y)^{m+n}$ then dy/dx	c) -1
IV. If $\sin(x+y) = \log(x+y)$ then dy/dx	d) y/x
	e) $-y/x$

A. b,a,c,d

B. b,a,d,c

C. a,b,c,d

D. b,a,c,e

Answer: B

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SET-4

1. The derivative of $(\log x)^x w.r.t x is (\log x)^{x-1}[1 + \log x \log(\log x)]$

$R: \frac{d}{dx}\left\{f(x)^{g(x)}\left[g(x)\frac{f'(x)}{f(x)} + g'(x)\log(f(x)\right]\right.$

A. Both A and R are true R is correct reason of A

B. Both A and R are treu R is not correct reason of A

C. A is true but R is false

D. A is false but R is true

Answer: A

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2. $A: If y = x^y$ then $\frac{dy}{dx} = \frac{y^2}{x(1 - \log y)}$

If $y = f(x)^y$, then $\frac{dy}{dx} = \frac{y^2 f'(x)}{f(x)[1 - y \log f(x)]} = \frac{y^2 f'(x)}{f(x)[1 - \log y]}$

A. Both A and R are true R is correct reason of A

B. Both A and R are treu R is not correct reason of A

C. A is true but R is false

D. A is false but R is true

Answer: A

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3. $A: If y = \sqrt{\sin x + y} then \frac{dy}{dx} = \frac{\cos x}{2y - 1}$

$R: If y = \sqrt{f(x) + y} then \frac{dy}{dx} = \frac{f'(x)}{2y - 1}.$

A. Both A and R are true R is correct reason of A

B. Both A and R are treu R is not correct reason of A

C. A is true but R is false

D. A is false but R is true

Answer: A

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4. $A: \frac{d}{dx}\left\{\tan^{-1}\left(\frac{a\cos x + b\sin x}{b\cos x - a\sin x}\right)\right. = 1$

$R: \frac{d}{dx}\left\{\tan^{-1}\left(\frac{a\cos f(x) + b\sin f(x)}{b\cos f(x) - a\sin f(x)}\right)\right\} = f'(x)$

A. Both A and R are true R is correct reason of A

B. Both A and R are treu R is not correct reason of A

C. A is true but R is false

D. A is false but R is true

Answer: A

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5. $A: If f(x) = x \sin\left(\frac{1}{x}\right)(x \neq 0)$ and $f(0) = 0$ then $f'(0) = 0$

$R: Lt_{x \to 0} \sin\left(\frac{1}{x}\right)$ does not exist

A. Both A and R are true R is correct reason of A

B. Both A and R are treu R is not correct reason of A

C. A is true but R is false

D. A is false but R is true

Answer: D

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6. Let $f(x) = x|x|$ and $g(x) = \sin x$

Statement -1 g° f is differentiable at $x = 0$ and its derivative is continous at that point

Statement -2 $g^\circ f$ is twice differentiable at $x = 0$.

A. Statement -1 is true, Statement-2 is true, Statement-2 is not a correct explanatin for Statement-1

B. Statement-1 is true , Statement-2 is false

C. Statement-1 is false, Statement-2 is true

D. Statement-1 is true, Statement-2 is true, Statement-2 is a correct explanation for Statement-1

Answer: B

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