MATHS

BOOKS - MARVEL MATHS (HINGLISH)

DIFFERENTIATION

MULTIPLE CHOICE QUESTIONS

1. If $\lim_{x \to a} \frac{f(x) - f(a)}{x - a}$ exists, then

A. $\lim_{x \to a} f(x)$ does not exist

B. $\lim_{x \to a} f(x) = 0$

C. $\lim_{x \to a} f(x) \neq f(a)$

D. $\lim_{x \to a} f(x) = f(a)$

Answer: D

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2. If $f(0) = 0 = g(0)$ and $f'(0) = 6 = g'(0) then \lim_{x \to 0} \frac{f(x)}{g(x)} =$

A. -1

B. 0

C. 1

D. 12

Answer: C

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3. If f is a differentiable function of x,then $\lim_{h \to 0} \frac{[f(x+n)]^2 - [f(x)]^2}{2h}$

A. $[f'(x)]^2$

B. $f(x).\, f'(x)$

C. $\frac{1}{2}[f'(x)]^2$

D. $\frac{1}{2}\left\{[f'(x)]^2 - [f(x)]^2\right\}$

Answer: B

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4. If a function f is differentiable at x= a, then $\lim_{h \to 0} \frac{f(a-h) - f(a)}{h} =$

A. $f'(a)$

B. $-f'(a)$

C. undefined

D. 1

Answer: B

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5. If f is derivable function of x, then $\lim_{h \to 0} \frac{f(x+h) - f(x-h)}{h} =$

A. $2f'(x)$

B. $f'(x)$

C. $(1/2)f'(x)$

D. $f'(0)$

Answer: A

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6. If $f(x) = \sqrt{x^2 + 9}$, write the value of $(\lim)_{x \to 4} \dfrac{f(x) - f(4)}{x - 4}$.

A. $5/4$

B. $-4/5$

C. $4/5$

D. $-5/4$

Answer: C

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7. If $f(1)=1, f'(1)=2,$ then write the value of $\left(\lim\right)_{x \to 1} \frac{\sqrt{f(x)}-1}{\sqrt{x}-1}$

A. 1

B. 2

C. 4

D. $1/2$

Answer: A

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8. If $f(9)=9$ and $f'(9)=4,$ then $\lim_{x \to 9} \frac{\sqrt{f(x)}-3}{\sqrt{x}-3} =$

A. -4

B. 4

C. 2

D. 1

Answer: B

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9. If an even function f is differentiable at x=0, then $f'(0) =$

A. -1

B. 0

C. 1

D. ± 1

Answer: B

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10. If f is an odd function such that $f'(3) = -2$, then the value of $f'(-3)$ is equal to

A. 3

B. 2

C. -2

D. -3

Answer: C

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11. $\frac{d}{dx}\left(\frac{7x^2 - 22x + 4}{x^5}\right) =$

A. $-21x^{-4}8x^{-5} + 20x^{--6}$

B. $-\left(21x^{-4} - 8x^{-5} + 20x^{-6}\right)$

C. $21x^{-4} - 8x^{-5} + 20x^{-6}$

D. $21x^{-4} + 8x^{-5} + 20x^{-6}$

Answer: B

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

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

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

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

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

Answer: C

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

A. $1 - \csc^2 x$

B. $-1 - \csc^2 x$

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

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

Answer: D

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14. If $u = \sqrt{1 + 2\sec x \tan x + 2\tan^2 x},$ then $u' =$

A. $u\sec x$

B. $u^{-1}\sec x$

C. $-u\sec x$

D. $u/\sec x$

Answer: A

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15. $\frac{d}{dx}[(ax+b)(cx+d)] =$

A. $2acx + ab + cd$

B. $2acx + ad + bc$

C. $2acx + ac + bd$

D. $acx + ad + bc$

Answer: B

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16. $\frac{d}{dx}\left[\frac{ax+b}{cx+d}\right] = \frac{N}{(cx+d)^2}, \text{ where } N =$

A. $ab + cd$

B. $ab - cd$

C. $ad + bc$

D. $ad - bc$

Answer: D

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17. If

$n \varepsilon N$ and $u_1 = x^n, u_2 = x^{n-1}, u_3 = x^{n-2}, \ldots, u_n = x,$ then $u_1' . u_2' . u_3 \ldots u_n' =$

A. $x^{n!}$

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

C. $(n!)x^{n(n+1)/2}$

D. $(n!)x^{n(n-1)/2}$

Answer: D

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18. If $\frac{d}{dx}\left(\frac{x}{\sin x}\right)=$

A. $\csc x(1+x\cot x)$

B. $\csc x(x\cot x-1)$

C. $\csc x(1-x\cot x)$

D. $\csc x(1+x\cos x)$

Answer: C

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

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

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

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

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

Answer: C

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

A. $x^2 - 4x - 1$

B. $x^2 + 4x - 1$

C. $x^2 + 4x + 1$

D. $x^2 + 4x + 1$

Answer: D

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21. If $y = \frac{x^2 + x + 1}{x^2 - x + 1}$, then $\left(x^2 - x + 1\right)^2 y_1 =$

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

B. $1 - x^2$

C. $x^2 - 1$

D. $2(x - 1)$

Answer: A

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22. $\frac{d}{dx}\left(\frac{\sin x}{1 + \cos x}\right) =$

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

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

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

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

Answer: B

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23. $\frac{d}{dx}\left(\frac{\cos x}{1+\sin x}\right)=$

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: A

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24. If $y=\frac{a-b\cdot\cos x}{a+b\cdot\cos x}$, then $(a+b\cdot\cos x)^2y_1=$

A. $ab\sin x$

B. $2ab\sin x$

C. $-ab\sin x$

D. $-2ab\sin x$

Answer: B

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25. If $y = \dfrac{a + b \cdot \sin x}{a - b \cdot \sin x}$, then $(a - b \cdot \sin x)^2 y_1 =$

A. $-2ab\cos x$

B. $-ab\cos x$

C. $ab\cos x$

D. $2ab\cos x$

Answer: D

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26. If $y = \frac{a\cos x - b\sin x}{a\sin x + b\cos x}$, then $(a\sin x + b\cos x)^2 y_1 =$

A. $a^2 - b^2$

B. $a^2 + b^2$

C. $-b^2 - a^2$

D. $-\left(b^2 - a^2\right)$

Answer: C

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

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

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

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

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

Answer: A

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

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

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

C. $\dfrac{1}{x^{2+a^2}}$

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

Answer: C

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29. Derivative of log $[\log(\log(\log x)]$w.r.t.x is the reciprocal of

A. logx

B. x log x

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

D. $\log(\log x)$

Answer: C

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30. If $f(x) = \log(\log x), \quad \text{then} \quad f'(e) =$

A. e

B. 1

C. 0

D. $1/e$

Answer: D

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

A. xe^{-y}

B. xe^{y}

C. x

D. $-x$

Answer: B

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32. $\frac{1 - \tan x}{1 + \tan x}$

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

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

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

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

Answer: D

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

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

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

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

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

Answer: D

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34. $\frac{d}{dx}\left(\frac{\cot x-\tan x}{\cot x+\tan x}\right)=$

A. $\cos 2x$

B. $\sin 2x$

C. $-2\sin 2x$

D. $2\sin 2x$

Answer: C

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35. $\frac{d}{dx}\left(\frac{\cos x + \sin x}{\cos x - \sin x}\right) =$

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

B. $2\sec 2x(\sec 2x + \tan 2x)$

C. $\tan 2x$

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

Answer: B

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36. If $y = \frac{a\tan x + b}{a\tan x - \sin x}$, then $(b\cos x - a\sin x)^2 y_1 =$

A. 2ab

B. ab

C. $-2ab$

D. $-ab$

Answer: C

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37. If $y = \frac{a - b\sin x}{b + a\sin x}$, then $(b + a\sin x)^2 y_1 =$

A. $\left(a^2 + b^2\right)\sin x$

B. $-\left(a^2 + b^2\right)\sin x$

C. $\left(a^2 + b^2\right)\cos x$

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

Answer: D

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38. If $y=\frac{a+b\cos x}{a-b\cos x}$, then $(a-b\cos x)^2 y_1=$

A. $2ab\sin x$

B. $-2ab\sin x$

C. $2ab\cos x$

D. $-2ab\cos x$

Answer: B

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39. If $u=\frac{x}{2}$, then $\frac{d}{dx}\left[\frac{2\sin x-\sin 2x}{2\sin x+\sin 2x}\right]=$

A. $\sec^2 u \tan u$

B. $\sec u \tan^2 u$

C. $\sec u \tan u$

D. $\sec^2 u \tan^2 u$

Answer: A

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40. $\frac{d}{dx}\left[\frac{1+\cos 2x+\sin 2x}{1+\sin 2x-\cos 2x}\right]=$

A. $\sec^2 2x$

B. $2\sec^2 2x$

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

D. $4\sec^2 2x$

Answer: C

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41. If $u = \frac{\cos x + \sin x}{\cos x - \sin x} = \frac{1}{v}$, then $u' - v' =$

A. $\sec^2 2x$

B. $2\sec^2 2x$

C. $4\sec^2 x$

D. $4\sec^2 2x$

Answer: D

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42. Derivative of $\tan 2x 6x \tan 8x$w.r.t.x is

A. $8\sec^2 8x + 6\sec^2 6x + \sec^2 2x$

B. $\sec^2 8x + 6\sec^2 6x + \sec^2 2x$

C. $8\sec^2 8x - \sec 6\sec^2 6x - 2\sec^2 2x$

D. $\sec^2 8x - \sec^2 6x - \sec^2 2x$

Answer: C

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43. If $A + B = \frac{\pi}{4}$, then $\frac{d}{dx}\{[1 + \tan(A - x)][1 + \tan(B + x)]\} =$

A. -1

B. 1

C. $\tan A \tan B$

D. 0

Answer: D

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44. If $y = x\tan\frac{x}{2}$, then $(1 + \cos x)\frac{dy}{dx} - \sin x =$

A. x

B. y

C. xy

D. 0

Answer: A

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45. If $x\sin\frac{x}{2} = y\cos\frac{x}{2}$, then $\frac{dy}{dx} =$

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

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

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

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

Answer: C

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46. If $x = y\tan\left(\frac{x}{2}\right)$, then $\frac{dy}{dx} =$

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

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

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

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

Answer: B

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47. $\frac{d}{dx}\left(\sec^2 x \csc^2 x\right) =$

A. $\sec x \tan x$

B. $2\sec^2 x \tan x + 2\csc^2 x \cot x$

C. $4\sec x \csc x$

D. $2\sec^2 x\csc^2 x\tan x - 2\csc^2 x\sec^2 x\cot x$

Answer: D

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48. If $u = \sec x + \tan x - 1, v = \sec x - \tan x + 1,$ then $u' v + v' u =$

A. $\sec^2 x$

B. $-\sec^2 x$

C. $2\sec^2 x$

D. $-2\sec^2 x$

Answer: C

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49. If $f(x) = \dfrac{1 - \sin^2 x}{1 + \sin^2 x},$ then $3f'\left(\dfrac{\pi}{4}\right) - f\left(\dfrac{\pi}{4}\right) =$

A. -3

B. 0

C. 1

D. 3

Answer: A

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

A. 1

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

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

D. -1

Answer: B

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51. Find $\frac{dy}{dx}$ of $y = \tan^{-1}\sqrt{\frac{1 - \cos x}{1 + \cos x}}$

A. 1

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

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

D. -1

Answer: C

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

A. 0

B. 1

C. -1

D. $3/2$

Answer: B

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53. $\frac{d}{dx}\left[\tan^{-1}\left(\frac{a\sin x + b\cos x}{a\cos x - b\sin x}\right)\right] =$

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

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

C. 1

D. 0

Answer: C

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

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

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

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

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

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

Answer: B

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56. $\dfrac{d}{dx}\left[\cot^{-1}\left(\dfrac{1 + \sqrt{1 - x^2}}{x}\right)\right] =$

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

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

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

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

Answer: C

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

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

B. 1

C. 2

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

Answer: D

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58. At $x = \frac{\pi}{4}, \frac{d}{dx}\left[\tan^{-1}\left(\frac{\cos x}{1+\sin x}\right)\right] =$

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

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

C. 1

D. -1

Answer: A

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

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

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

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

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

Answer: C

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

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

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

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

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

Answer: B

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61. $\frac{d}{dx}\left[\sin^{-1}\left(\frac{3\cos x+4\sin x}{5}\right)\right]=$

A. 1

B. 0

C. -1

D. ± 1

Answer: A

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62. What is the derivative of $\cos^{-1}\left(\frac{2\cos x + 3\sin x}{\sqrt{13}}\right)$?

A. 0

B. 1

C. ± 1

D. -1

Answer: B

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63. $\sin^{-1}\left(\frac{3x+4\sqrt{1-x^2}}{5}\right)$

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

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

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

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

Answer: A

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

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

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

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

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

Answer: D

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

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

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

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

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

Answer: C

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

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

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

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

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

Answer: B

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

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

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

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

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

Answer: C

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68. $\dfrac{d}{dx}\tan^{-1}\left(\dfrac{x}{1-\sqrt{1+x^2}}\right)\Bigg] =$

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

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

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

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

Answer: A

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

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

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

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

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

Answer: C

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70. $\frac{d}{dx}\left[\tan^{-1}\left(\frac{10x}{4-6x^2}\right)\right] =$

A. $\frac{5}{2+3x^2}$

B. $\frac{10\left(4+6x^2\right)}{\left(4+9x^2\right)\left(4+4x^2\right)}$

C. $\dfrac{10\left(4 - 6x^2\right)}{\left(4 + 9x^2\right)\left(4 - 4x^2\right)}$

D. $\dfrac{1}{4 + x^2} + \dfrac{1}{6 + 4x^2}$

Answer: B

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71. $\dfrac{d}{dx}\left[\tan^{-1}\left(\dfrac{4x - 4x^3}{1 - 6x^2 + x^4}\right)\right] =$

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

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

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

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

Answer: B

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72. $\frac{d}{dx}\left[\tan^{-1}\left(\frac{12x - 64x^3}{1 - 48x^2}\right)\right] =$

A. $\frac{1}{1 + 16x^2}$

B. $\frac{4}{1 + 16x^2}$

C. $\frac{12}{1 + 16x^2}$

D. $\frac{-12}{1 + 16x^2}$

Answer: C

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73. $\frac{d}{dx}\left[\sin^{-1}\left(x - \frac{4x^3}{27}\right)\right] =$ 4x327dx

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

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

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

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

Answer: B

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74. If $\cos^{-1}\left(\frac{x^2-y^2}{x^2-y^2}\right)=\log a$, then $\frac{dy}{dx}$ is

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

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

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

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

Answer: C

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75. 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. -2

B. 2

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

D. 1

Answer: C

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76. If $\sin y = \dfrac{x^2}{\sqrt{a^4+x^4}}$, then $\dfrac{dy}{dx}x = 1 =$

A. $\dfrac{a^2}{2\left(a^4+1\right)}$

B. $\dfrac{2a^4}{\left(a^2+1\right)}$

C. $\dfrac{2a}{\left(a^4+1\right)}$

D. $\dfrac{2a^2}{\left(a^4+1\right)}$

Answer: D

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77. If $f(x) = \dfrac{x^2 - a^2}{x^2 + a^2}$ and $f'(1) = 1$, then $a =$,

A. -1

B. 1

C. ± 1

D. 2

Answer: C

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78. If

$$y = \tan^{-1}\left[\frac{1 - 2\log x}{1 + 2\log x}\right] + \tan^{-1}\left[\frac{3 + 2\log x}{1 - 6\log x}\right], \text{ then } \left(\frac{dy}{dx}\right)_{x=3} + \left(\frac{dy}{dx}\right)_{x=-3} =$$

A. -6

B. 0

C. 2

D. -2

Answer: B

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79. $\frac{d}{dx}\left[\sin^{-1}\left(\frac{3x - x^3}{2}\right)\right]$

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

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

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

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

Answer: D

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80. $\dfrac{d}{dx}\left[\sec\left(\tan^{-1}x\right)\right] =$

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

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

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

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

Answer: A

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81. If the derivative of $\tan^{-1}(a + bx)$ at $x = 0$ is 1, then $1 - b^3 + a^6$

A. $3a^2b$

B. $3b^2a$

C. $-3a^2b$

D. $-3b^2a$

Answer: C

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82. If $y = \cos^{-1}\left(\left(\frac{x^{2n} - 1}{x^{2n} + 1}\right)\right)$, then $\left(1 + x^{2n}\right)y_1 =$

A. $-2nx^n$

B. $2nx^n$

C. $-2nx^{n-1}$

D. $2nx^{n-1}$

Answer: C

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83. If $f(x) = \sqrt{x + 2\sqrt{x}}$, then $f'(1) =$

A. 1

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

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

D. $\sqrt{3}$

Answer: C

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84. If $y = \sqrt{\frac{\sqrt{x-1}}{\sqrt{x+1}}}$, then $\frac{dy}{dx}\Big|_{x=4} =$

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

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

C. $\frac{\sqrt{36}}{3}$

D. $\frac{\sqrt{3}}{36}$

Answer: D

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85. If $x\log y - y\log x = 1$, then $\left(\frac{dy}{dx}\right)$ at $x = 1$ is

A. $e - 1$

B. e

C. $e(e - 1)$

D. $e(e + 1)$

Answer: C

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86. If $f(x) = \sqrt{\dfrac{1 + \sin^{-1}x}{1 - \tan^{-1}x}}$, then $f'(0)$ is equal to:

A. -1

B. 0

C. 1

D. 2

Answer: A

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87. $\dfrac{d}{dx}\left(3^{3^x}\right) =$

A. $2 \cdot 3^x \cdot 3^{3^x} \cdot l\log 3$

B. $3^x \cdot (\log 3)^2$

C. $3^{3^x} \cdot (\log 3)^2$

D. $3^{3^x} \cdot 3^x \cdot (\log 3)^2$

Answer: D

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88. $\frac{d}{dx}\left[\frac{2^x 3^{2^x}}{5^x 7^x}\right] =$

A. $\left(\frac{18}{35}\right)^x \log\left(\frac{35}{18}\right)$

B. $\left(\frac{18}{35}\right)^x$

C. $\left(\frac{18}{35}\right)^x \log\left(\frac{18}{35}\right)$

D. $\left(\frac{5}{12}\right)^x \log\left(\frac{5}{12}\right)$

Answer: C

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89. If $3^x + 3^y = 3^{x+y}$ then what is $\frac{dy}{dx}$ equal to?

A. 3^{x-y}

B. -3^{y-x}

C. 3^{y-x}

D. -3^{x-y}

Answer: B

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

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

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

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

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

Answer: D

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91. If $y = x\sin y$, then $\dfrac{dy}{dx} =$

A. $\dfrac{1 - x\sin y}{x\cos y}$

B. $\dfrac{1 - \sin y}{x\cos y}$

C. $\dfrac{1 - x\sin y}{\sin y}$

D. $\dfrac{\sin^2 y}{\sin y - y\cos y}$

Answer: D

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92. If $xy = \sin^{-1}(xy) + \cos^{-1}(xy)$, then $\dfrac{dy}{dx} =$

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

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

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

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

Answer: B

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93. If $bx^2 + ay^2 = (x + y)^2, \text{ then } \frac{dy}{dx} =$

A. $\frac{bx + x + y}{x - y + ay}$

B. $\frac{bx - x - y}{x + y - ay}$

C. $\frac{bx - x - y}{x - y + ay}$

D. $\frac{bx + x - y}{x - y - ay}$

Answer: B

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

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

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

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

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

Answer: B

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95. If $x^m . y^n = (x + y)^{m+n}$ then $\frac{dy}{dx}$ is:

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

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

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

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

Answer: A

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96. If $x^2y^3 = (x+y)^{n+2}$ and $\frac{dy}{dx} = \frac{y}{x}$ then $n =$

A. 2

B. 3

C. 6

D. 4

Answer: B

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97. If $x^3y^4 = (x+y)^n$ and $\frac{dy}{dx} = \frac{y}{x}$, then $n =$

A. 3

B. 4

C. -1

D. 7

Answer: D

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98. If $2y^2 - x^2 - y = 0$, then $\left(\frac{dy}{dx}\right) at(-1, -1)$ is

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

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

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

D. $-\frac{2}{5}$

Answer: C

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99. If $2x^2 + 3y + 5y^2 + x + 9 = 0$, then $\left(\frac{dy}{dx}\right) at(-1, -1)$ is

A. $13/6$

B. $6/13$

C. $-13/6$

D. $-6/13$

Answer: D

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100. If $y = e^{1+xy}$, then $\frac{dy}{dx} =$

A. $\frac{y^2}{1+xy}$

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

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

D. $\dfrac{y^2}{xy - 1}$

Answer: B

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101. If $x = y^3 - 4y + 1, \text{ then } \dfrac{dy}{dx} =$

A. $\dfrac{1}{4 + 3y^2}$

B. $\dfrac{1}{4 - 3y^2}$

C. $\dfrac{1}{3y^2 - 4}$

D. $\dfrac{1}{4 + 3y^2}$

Answer: C

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102. If $x^4(1 + y) = 1y, \text{ then } \dfrac{dy}{dx} =$

A. $\frac{8x^3}{1+x^4}$

B. $\frac{1+x^4}{8x^3}$

C. $\frac{\left(1+x^4\right)^2}{8x^3}$

D. $\frac{-\left(1+x^4\right)^2}{8x^3}$

Answer: D

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

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

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

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

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

Answer: A

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104. If $y = \sqrt{x + \sqrt{x + \sqrt{x.. \text{ to } \infty}}}$, then $\frac{dy}{dx} =$

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

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

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

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

Answer: A

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105. If $y = \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x... \text{ to } \infty}}}$, then $(2y - 1)y_1 =$

A. $\sin x$

B. $-\cos x$

C. $-\sin x$

D. $\cos x$

Answer: D

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106. If $y = \dfrac{1 + \cos 2x}{3 - 2\sin 2x}$, then $(3 - 2\sin 2x)^2 y_1 =$

A. $2\sin 2x - 4$

B. $2\sin 2x + 4$

C. $4 - 2\sin 2x$

D. $4\cos x(2\cos x - 3\sin x)$

Answer: D

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107. If $y = \frac{2 + \sin x}{1 + 2\sin x}$, and $(1 + 2\sin x)^2 y_1 = k\cos x$, then $k =$

A. -2

B. -3

C. 1

D. 4

Answer: B

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

A. $\sin^2 x$

B. $\cos^2 x$

C. $-\sin^3 x$

D. $-\cos^3 x$

Answer: C

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

A. $\sin^2 x$

B. $\cos^2 x$

C. $-\sin^3 x$

D. $(3\cos x + \cos 3x)/4$

Answer: D

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110. If $\frac{d}{dx}\left(x - \tan x + \frac{1}{3}\tan^3 x\right) = \tan^n x, \quad \text{then} \quad n =$

A. 2

B. 3

C. 4

D. 5

Answer: C

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111. If $\frac{d}{dx}\left(\tan x+\frac{2}{3}\tan^{3}x+\frac{1}{5}\tan^{5}x\right)=\sec^{n}x,\ \text{ then }\ n=$

A. 7

B. 6

C. 4

D. 5

Answer: B

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112. $\dfrac{d}{dx}\left[\lim h \to 0 \dfrac{(x+h)^4 - x^4}{h}\right] =$

A. $12x^2$

B. $36x^2$

C. $72x$

D. $24x$

Answer: A

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113. $\dfrac{d}{dx}\left[\log\left(\dfrac{e^{4x}}{1+e^{4x}}\right)\right]$

A. $\dfrac{-1}{1+e^{4x}}$

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

C. $\dfrac{-3}{1+e^{4x}}$

D. $\dfrac{4}{1 + e^{4x}}$

Answer: D

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114. If $y = \log\left(x^2 + \sqrt{x^4 - a^4}\right)$, then $y_1\sqrt{x^4 - a^4} =$

A. x

B. 2x

C. 3x

D. 4x

Answer: B

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115. if $y = \log\left(e^{2x} + \sqrt{1 + e^{4x}}\right)$ and $y_1\sqrt{1 + e^{4x}} = me^{mx}$ then $m =$

A. 4

B. 3

C. 2

D. 1

Answer: C

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116. If $y = \log\left(e^{-x} + xe^{-x}\right)$, then $(1 + x)y_1 =$

A. $-x$

B. x

C. 2x

D. -1

Answer: A

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

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

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

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

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

Answer: C

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

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

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

C. $\dfrac{2^{x+1}\log 2}{1+4^x}$

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

Answer: C

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119. $\dfrac{d}{dx}\left[\tan^{-1}\left(\dfrac{\log(ex)}{\log(e/x)}\right)\right]=\dfrac{1}{xf(x)}$, then $f(x)=$

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

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

C. 1

D. $1+2\log x$

Answer: B

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120. If $\frac{d}{dx}\left[\log_{10}\left(\log_{10}x\right)\right] = \frac{\log_{10}e}{f(x)}$, then $f(x) =$

A. $\log_{10}x$

B. $\log_x 10$

C. $x\log_{10}x$

D. $x\log x$

Answer: D

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121. If $y = 4^{\log 2(\sin x)} + 9^{\log 3(\cos x)}$, then $\left(\log 2(\log 3)y_1 =\right.$

A. 0

B. $\sin 2x$

C. $\log 5$

D. 1

Answer: A

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

A. $1 + y^2$

B. $1 - y^2$

C. $y^2 - 1$

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

Answer: B

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123. If $y = \frac{a + b\tan x}{b - a\tan x}$, then $\frac{dy}{dx} =$

A. $1 + y^2$

B. $1 - y^2$

C. $-\left(1 + y^2\right)$

D. $y^2 - 1$

Answer: A

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

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

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

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

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

Answer: C

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125. If $xy - \sqrt{\left(1 - x^2\left(1 - y^2\right)\right)} = 0$, then $\frac{dy}{dx} =$

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

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

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

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

Answer: B

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

A. 0

B. -1

C. 1

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

Answer: B

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

A. x

B. $-x$

C. 2x

D. $-2x$

Answer: D

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

A. $-2\sin 2x$

B. $-2\cos 2x$

C. $2\sin 2x$

D. $2\cos 2x$

Answer: D

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129. $\frac{d}{dx}\left[\sin^{-1}\left(x^2 - \frac{1}{2}\right)\right]$ at $x = 0$

A. 1

B. -1

C. 0

D. 2

Answer: C

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130. $\frac{d}{dx}\left[\tan^{-1}\left(\frac{6x}{1+7x^2}\right)\right]+\frac{d}{dx}\left[\tan^{-1}\left(\frac{5+2x}{2-5x}\right)\right]=$

A. $\frac{7}{1+49x^2}$

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

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

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

Answer: A

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131. Given $f(1)=-1$ and $f'(1)=2$ If $h(x)=[f(x)]^2$, then $h'(1)=$

A. $\frac{5}{9}$

B. $\frac{10}{9}$

C. -4

D. 8

Answer: C

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132. $\frac{d}{dx}\left[\tan^{-1}(\cos ecx + \cot x)\right] =$

A. -1

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

C. 1

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

Answer: B

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

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

B. 1

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

D. -1

Answer: C

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134. $\frac{d}{dx}\left[\tan^{-1}\left\{\left(\sec x+\tan^{2}x\right\}\right]=$

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

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

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

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

Answer: D

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

A. 2

B. 1

C. -1

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

Answer: A

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

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

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

C. 0

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

Answer: C

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

A. 0

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

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

D. 1

Answer: B

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

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

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

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

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

Answer: D

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139. If $y=\tan^{-1}\left(\frac{2}{e^{-x}-e^{x}}\right)$ then $\left(1+e^{2x}\right)y_1=$

A. $2e^{2x}$

B. $3e^{2x}$

C. $4e^{2x}$

D. $5e^{2x}$

Answer: A

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140. If $\sin y = x\sin(a + y)$, then the value of $\frac{dy}{dx}$ is -

A. $\sin^2 a$

B. $\sin^2 y$

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

D. $\cos^2(a + y)$

Answer: C

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141. If $xy - \log y = 1, \quad \text{then} \quad \frac{dy}{dx} =$

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

B. $\dfrac{-y^2}{\log y}$

C. $\dfrac{x^2}{\log y}$

D. $\dfrac{-y^2}{\log x}$

Answer: B

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142. If $x^y = e^{x-y}$, then $(1+\log x)^2 y_1 =$

A. e^x

B. e^y

C. $x - y$

D. $\log x$

Answer: D

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143. If $y = xe^{xy}$ and $\frac{dy}{dx} = \frac{y(1+u)}{x(1-u)}$, then $u =$

A. xy

B. e^{xy}

C. $\log(xy)$

D. e^{xy}

Answer: A

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144. 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. $\left(1 + \dfrac{dy}{dx}\right)\sin(x + y)$

Answer: C

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145. If $x + \cos(xy) = 0, \quad \text{then} \quad \dfrac{dy}{dx} =$

A. $\operatorname{cos}ec(xy)$

B. $\dfrac{1 - y\sin(xy)}{x\sin(xy)}$

C. $\dfrac{\cos(xy)}{1 + \sin(xy)}$

D. $\dfrac{\sin(xy)}{1 + \cos(xy)}$

Answer: B

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146. If $\dfrac{\sin(xy)}{1 + \cos(xy)}$

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

B. $\dfrac{x - y^2}{x^2 - y}$

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

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

Answer: C

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147. If $\sqrt{x} + \sqrt{y} = \sqrt{a}, \text{ then } \dfrac{dy}{dx} =$

A. $\sqrt{\dfrac{x}{y}}$

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

C. $-\sqrt{\dfrac{y}{x}}$

D. $-\sqrt{a}$

Answer: C

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148. If $x^y = e^x$, then $(\log x)^2 y_1 =$

A. $\log e$

B. $\log x$

C. $\log(e/x)$

D. $\log(x/e)$

Answer: D

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149. If $y = xe^y$, then $(1 - y)y_1 =$

A. e^x

B. e^y

C. $y\log x$

D. $x\log y$

Answer: B

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150. If $y = xe^{y}$, then $x(1 - y)y_1 =$

A. $-x$

B. x

C. y

D. $-y$

Answer: C

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151. If $y = x\sin y$, then $x(1 - x\cos y)y_1 =$

A. $-y$

B. y

C. x

D. $-x$

Answer: B

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152. If $y = x\sin y, \quad \text{then } x(1 - x\cos y)y_1 =$

A. x

B. y

C. $-x$

D. 1

Answer: D

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153. If $y = \frac{x^{2/3} - x^{-1/3}}{x^{2/3} + x^{-1/3}}$, then $(x+1)^2 y_1 =$

A. 2

B. $2/3$

C. $-1/3$

D. -3

Answer: A

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

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

B. t

C. at

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

Answer: D

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155. If $x = at, y = \frac{a}{t}$, then $\frac{dy}{dx} =$

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

B. t^2

C. $-t^2$

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

Answer: D

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156. If $x = b\cos^2\theta, y = a\sin^2\theta$, then $\frac{dy}{dx} =$

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

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

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

D. - $\frac{b}{a}$

Answer: B

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157. If $x = b\cos^3\theta, y = a\sin^3\theta, \text{ then } \frac{dy}{dx} =$

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

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

C. $\left(-\frac{a}{b}\right)\tan\theta$

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

Answer: C

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158. If $x = a\sec^2\theta, y = b\tan^2\theta,$ then $\dfrac{dy}{dx} =$

A. $\left(\dfrac{a}{b}\right)\csc\theta$

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

C. 1

D. $\left(\dfrac{b}{a}\right)$

Answer: D

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

A. $\tan t$

B. $\tan\left(\dfrac{1}{2}\right)$

C. $\cot\left(\frac{t}{2}\right)$

D. $\cot t$

Answer: B

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

A. $\cot\left(\frac{\theta}{2}\right)$

B. $-\cot\left(\frac{\theta}{2}\right)$

C. $-\tan\left(\frac{\theta}{2}\right)$

D. $\tan\left(\frac{\theta}{2}\right)$

Answer: A

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161. If $x + 3\cos\theta = 2\cos^3\theta, y + 2\sin^3\theta = 3\sin\theta$, then $\dfrac{dy}{dx} =$

A. $\cot\theta$

B. $\tan\theta$

C. $-\cot\theta$

D. $-\tan\theta$

Answer: C

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162. If $x + \cos^3\theta = 3\cos\theta, y + \sin^3\theta = 3\sin\theta$, then $\dfrac{dy}{dx} =$

A. $\tan^3\theta$

B. $-\tan^3\theta$

C. $-\cot^3\theta$

D. $\cot^3\theta$

Answer: C

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163. 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. $-\cot\theta$

D. $-\tan\theta$

Answer: A

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164. If $x = 2\cos t - \cos 2t, y = 2\sin t - \sin 2t,$ then $\frac{dy}{dx} =$

A. $\tan t$

B. $\cot\left(\frac{3t}{2}\right)$

C. $\tan\left(\frac{3t}{2}\right)$

D. $\cot t$

Answer: C

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

A. $-\cot\left(\frac{3t}{2}\right)$

B. $\tan\left(\frac{3t}{2}\right)$

C. $\tan t$

D. $\cot t$

Answer: A

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

A. 1

B. 0

C. 2

D. - 1

Answer: D

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167. If $x = t^2 + \frac{1}{t^2}, y = t - \frac{1}{t}$, then $\frac{dy}{dx} =$

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

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

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

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

Answer: D

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168. If $x = a\left(t + t^{-1}\right), y = a\left(t - t^{-1}\right), \text{ then } \frac{dy}{dx} =$

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

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

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

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

Answer: C

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169. If $x^2 + y^2 = t + t^{-1}, x^4 + y^4 = t^2 + t^{-2}, \text{ then } yy_1 =$

A. x^{-2}

B. $-x^{-3}$

C. x^{-1}

D. $-x^{-1}$

Answer: B

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170. If $x = a(\cos t + t\sin t), y = a(\sin t - t\cos t)$, then $\left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2 =$

A. $-t^2$

B. t^2

C. $-a^2t^2$

D. a^2t^2

Answer: D

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171. If $x = \theta\sin 2\theta, y = \theta\cos 2\theta,$ then $\frac{dy}{dx}$ at $\theta = \frac{\pi}{4}$ is

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

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

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

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

Answer: A

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172. If $x = \sin\theta\cos 2\theta, y = \cos\theta\sin 2\theta,$ then $\left(\frac{dy}{dx}\right)$ at $\theta = \frac{\pi}{4}$ is

A. -2

B. 2

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

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

Answer: D

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173. If $x = \cos\theta(1 + \cos\theta), y = \sin\theta(1 + \cos\theta),$ then $\left(\frac{dy}{dx}\right)$ at $\theta = \frac{\pi}{2}$ is

A. -1

B. 0

C. 1

D. 2

Answer: C

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174. If $x = \sin\theta + \theta\cos\theta, y = \cos\theta - \theta\sin\theta,$ then $\left(\frac{dy}{dx}\right)$ at $\theta = \frac{\pi}{2}$ is

A. $\frac{\pi}{4}$

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

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

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

Answer: B

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175. If $x = ae^{\theta}(\sin\theta - \cos\theta), y = ae^{\theta}(\sin\theta + \cos\theta),$ then $\left(\frac{dy}{dx}\right)$ at $\theta = \frac{\pi}{2}$ is

A. 0

B. -1

C. 1

D. 2

Answer: A

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176. If $x = \cos^{-1}t, y = \log\left(1 - t^2\right)$, then $\left(\frac{dy}{dx}\right)$ at $t = \frac{1}{2}$ is

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

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

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

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

Answer: A

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177. Derivative of $\tan x w.r.t. \sec x$ is

A. $\tan x$

B. $\tan x$

C. $\csc x$

D. $\csc x$

Answer: C

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178. Derivative of log $(\cos ecx)w.\ r.\ t.\ \cot x$ is

A. $\tan x$

B. $-\tan x$

C. $-\cot x$

D. $\sin x \cdot \cos x$

Answer: D

Watch Video Solution

179. $e^x\cos$ x w.r.t.$e^x\sin x$

A. $\cot x$

B. $-\cot x$

C. e^{2x}

D. $-e^{2x}$

Answer: C

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180. Derivative of $\log\left(1+x^2\right) w.r.t. \left(x-\tan^{-1}x\right)$ is

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

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

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

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

Answer: B

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

A. $\sec\theta$

B. $\csc\theta$

C. $|\sec\theta|$

D. $|\csc\theta|$

Answer: C

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

A. 0

B. 12

C. 24

D. $24x$

Answer: C

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183. If $y\sin x = x + y$, then $\left(\frac{dy}{dx}\right)at x = 0$ is

A. 1

B. - 1

C. 0

D. 2

Answer: B

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184. $y = f(x)$ be a real valued twice differentiable function defined on R

then $\frac{d^2y}{dx^2}\left(\frac{dx}{dy}\right)^2 + \frac{d^2x}{dy^2} =$

A. $\frac{d^4y}{dx^4} + \left(\frac{dy}{dx}\right)^3$

B. $1 + \left(\frac{dy}{dx}\right)^3 \cdot \frac{d^4x}{dy^4}$

C. 0

D. $\frac{d^3y}{dx^3}$

Answer: C

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185. If $x^y = \log x$ then $\left(\frac{dy}{dx}\right) at x = e$ is

A. 0

B. 1

C. e

D. $1/e$

Answer: D

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186. If $y = \sqrt{\cos 2x}$, then: $yy_2 + 2y^2 =$

A. 0

B. $-y^2 =$

C. y_1^2

D. yy_1

Answer: B

Watch Video Solution

187. If $f(x) = \sqrt{ax} + \frac{a^2}{\sqrt{ax}}$, then f (a)=`

A. 0

B. -1

C. 1

D. a

Answer: A

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188. $xy = (x+y)6nand\frac{dy}{dx} = \frac{y}{x}the \cap = 1$ b.2 c. 3 d. 4

A. 1

B. 2

C. 3

D. 4

Answer: B

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189. If H,G are differentiable functions such that $G = 1/H$, where $H \neq 0$, then $H' : H$ is as

A. $G : G'$

B. $G' : G$

C. $-G' : G$

D. $-G. G'$

Answer: C

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190. Derivative of $(f \circ g)(x) w.r.t. g(x)$ is

A. $(f' \circ g)(x)$

B. $(f \circ g)(x) \circ g'(x)$

C. $(f \circ g)(x) : g'(x)$

D. $(f \circ g')(x)$

Answer: A

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191. If $f(x) = x^2 g(x)$, then $f''(x) =$

A. $x^2 g''(x) + 2x'(x) + 2g(x)$

B. $2g''(x)$

C. $x^2 g''(x) + 4xg'(x) + 2g(x)$

D. $x \cdot g''(x) + g(x) + 2g(x)$

Answer: C

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192. If $x = \phi(t), y = \Psi(t), \text{ then } \frac{d^2y}{dx^2}$ is equal to

A. $\frac{g(t)}{f(t)}$

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

C. $\dfrac{g^n(t), f(t) - g'(t)f(t)}{[f'(t)]^2}$

D. $\dfrac{f(t)}{g(t)}$

Answer: B

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193. Let $f(x)$ be a polynomial.Then, the second order derivative of $f\left(e^x\right)$ is

$f^{e^x}e^{2x} + f'\left(e^x\right)e^x$ $f^{e^x}e^x + f'\left(e^x\right)$ $f^{e^x}e^{2x} + f^{e^x}e^x$ (d) f^{e^x}

A. $e^xf\left(e^x\right) + f\left(e^x\right)$

B. $e^{2x}f\left(e^x\right) + e^{2x}f'\left(e^x\right)$

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

D. $e^{2x}f\left(e^x\right) + e^xf\left(e^x\right)$

Answer: D

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194. If $y = ae^{mx} + be^{-mx}, \text{ then } y_2 =$

A. $-m^2y$

B. m^2y

C. $-my$

D. my

Answer: B

Watch Video Solution

195. If $y = a\cos mx + b\sin mx, \text{ then } y_2 =$

A. $-m^2y$

B. m^2y

C. $-my$

D. my

Answer: A

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196. If $p=\frac{dy}{dx}$ then $\frac{d^2y}{dx^2}=$

A. $y\frac{dy}{dp}$

B. $p\frac{dp}{dy}$

C. $x\frac{dp}{dy}$

D. $p\frac{dy}{dp}$

Answer: B

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197. If $\left(\frac{dy}{dx}\right)^2+y^2=1\frac{2a}{y}$, then $\frac{d^2y}{dx^2}+y=$

A. 0

B. 2a

C. $-\frac{a}{y^2}$

D. $\frac{2a}{y^2}$

Answer: C

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198. If $x^2 - y^2 = a^2$, then $y^3 y_2 =$

A. a^2

B. $-a^2$

C. -1

D. 0

Answer: B

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199. If $y^2 = ax^2 + 2bx + c, \text{ then } y^3 y_2 =$

A. $ax^2 + bx + c$

B. $ax^2 + bx + c$

C. constant

D. $ay^2 + 2by + c$

Answer: C

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200. If $x^2 + y^2 = 1, \text{ then } \frac{d^2x}{dy^2}$

A. $-y^3$

B. y^3

C. x^3

D. x^{-3}

Answer: D

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

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

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

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

D. $-4(x+1)^3$

Answer: B

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202. If $y^2 = ax^2 + 2bx + c, \text{ then } (ax+b)^3 \frac{d^2x}{dy^2} =$

A. $b^2 - 4ac$

B. $b^2 - ac$

C. 1

D. $\sqrt{b^2 - 4ac}$

Answer: B

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203. If $x = at^2, y = 2at, \text{ then } t^2yy_2 =$

A. 1

B. 0

C. -1

D. 2

Answer: C

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204. If $x = \tan t - t, y = \sec t,$ then $y^3 y_2 + (y_1)^4 =$

A. 0

B. 1

C. -1

D. 2

Answer: A

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205. If $y = e^{m \sin^{-1} x},$ then $(1 + x^2) y_2 - x y_1 =$

A. 0

B. 1

C. $-m^2 y$

D. m^2y

Answer: D

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206. If $y = \cos\left(m\sin^{-1}x\right)$, then $\left(1 - x^2\right)y_2 - xy_1 =$

A. 0

B. 1

C. $-m^2y$

D. m^2y

Answer: C

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207. If $x = \sin t, y = \cos pt$, then $\left(1 - x^2\right)y_2 - xy_1 =$

A. 0

B. 1

C. p^2y

D. $-p^2y$

Answer: D

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208. If $y = x + \sqrt{x^2 - 1}$, then $\left(x^2 - 1\right)y_2 + xy_1 =$

A. 0

B. 1

C. y

D. $-y$

Answer: C

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209. If $y^{1/m}=\left(x+\sqrt{1+x^2}\right)$, then $\left(1+x^2\right)y_2+xy_1$ is (where y_r represents the rth derivative of y w.r.t. x)

A. m^2y

B. $-m^2y$

C. 0

D. $-m$

Answer: A

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210. If $y=\left(\sin^{-1}x\right)^2$, then $\left(1-x^2\right)y_2-xy_1=$

A. 0

B. 1

C. 2

D. 4

Answer: C

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211. If $y = ax^{n+1} + bx^{-n}$, then $x^2 \frac{d^2y}{dx^2} = n(n-1)y$ (b) $n(n+1)y$ (c) ny (d) n^2y

A. $n(n-1)y$

B. $n(n+1)y$

C. 1

D. ny

Answer: B

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212. If $f(x) = \sin\left(x^2\right)$, then $xf'(x) + 4x^3 f(x) =$

A. $f\left(x^2\right)$

B. $f(x)$

C. $f'\left(x^2\right)$

D. $f'(x)$

Answer: D

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213. If $y = \log(\log x)$, then $xy_2 + x\left(y_1\right)^2 =$

A. y

B. $-y$

C. $-y_1$

D. y_1

Answer: C

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214. If $y = e^{\sqrt{x}} + e^{-\sqrt{x}}$, then $4xy_2 + 2y_1 =$

A. y

B. $-y$

C. 0

D. 2y

Answer: A

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215. If $y = \sin\left(e^x\right) + \cos\left(e^x\right)$, then $y_2 - y_1 =$

A. e^{2x}

B. ye^{2x}

C. $-ye^{2x}$

D. $2ye^{x}$

Answer: C

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216. If $y = e^{x}\sin x$, then $y_2 - 2y_1 =$

A. y

B. 2y

C. $-y$

D. $-2y$

Answer: D

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217. If $y = e^{x}(\cos x + \sin x)$, then $y_2 - 2y_1 =$

A. y

B. $-2y$

C. 2y

D. $-y$

Answer: B

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218. If $y = e^{ax}\sin bx$, then $\frac{d^2y}{dx^2} - 2a\frac{dy}{dx} =$

A. 0

B. $\left(a^2 + b^2\right)y$

C. $-\left(a^2 + b^2\right)y$

D. $\left(a^2 - b^2\right)y$

Answer: C

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219. If $y=\left(\tan^{-1}x\right)^2$, then prove that $\left(1+x^2\right)^2y_2+2x\left(1+x^2\right)y_1=2$.

A. 0

B. 1

C. 2

D. -1

Answer: C

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220. If $y=xe^{-1/x}$, then $x^3y_2-xy_1=$

A. $-y$

B. y

C. 0

D. 1

Answer: A

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221. If $y = e^{\sqrt{x}}\left(\sqrt{x} - 1\right)$, then $4xy_2 - 2y_1 =$

A. $-y$

B. y

C. 0

D. 1

Answer: B

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222. If $y = bx^2 + (a/x)$ then $x^2 y_2 =$

A. 2

B. $-2y$

C. $-y$

D. 2y

Answer: D

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223. 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. 20xy

Answer: C

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

A. $\frac{4a}{7}$

B. $\frac{7}{4a}$

C. - $\frac{7}{4a}$

D. - $\frac{4a}{7}$

Answer: B

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225. if $ay^4 = (x + b)^5$ then $5yy_2 =$

A. -y_1^2

B. $-y_1^3$

C. $-y_1$

D. $-y_1^2$

Answer: D

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226. If P (x) is polynomial of degree 2 and $P(3) = 0, P'(0) = 1, P''(2) = 2, \text{ then } p(x) =$

A. $x^2 + x + 12$

B. $x^2 - x + 12$

C. $-x^2 + x + 12$

D. $x^2 + x - 12$

Answer: D

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227. If $bx^2 + ay^2 = c$, then $y^3y_2 =$

A. $\frac{bc}{a^2}$

B. - $\frac{bc}{a^2}$

C. $\frac{bc}{c^2}$

D. - $\frac{bc}{c^2}$

Answer: B

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228. If $y = ae^x + be^{-x} + c$, then $y''' =$

A. y

B. 0

C. y'

D. y''

Answer: C

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229. If $x = \theta - \sin\theta$ and $y = 1 - \cos\theta$, then $\frac{d^2y}{dx^2} =$

A. $4\left(7 - 4\sqrt{3}\right)$

B. $\frac{7 + 4\sqrt{3}}{4}$

C. $\frac{7 - 4\sqrt{3}}{4}$

D. $4\left(4 + 7\sqrt{3}\right)$

Answer: A

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230. If $\log y = \tan^{-1}x$, then $\left(1 + x^2\right)y_2 + (2x - 1)y_1 + 4 =$

A. 0

B. $2\log y$

C. 4

D. 1

Answer: C

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

A. xx^{x-1}

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

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

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

Answer: C

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

A. x^{12x^2}

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

C. $4x^3\log x$

D. $12x^{2x}$

Answer: B

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

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

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

C. $y\left[\log\left(\frac{x+1}{x}\right)-\frac{1}{x+1}\right]$

D. $y \cdot \log(x+1)$

Answer: C

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234. If $y = \sqrt{\frac{a-x}{a+x}}\left(x^2 - b^2\right)$, then $\frac{1}{y}\frac{dy}{dx} =$

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

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

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

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

Answer: A

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235. If $\exp(m) = e^m$ and $y = \exp\left[\sqrt{\dfrac{x-1}{x+1}}\right]$, then $\left(x^2 - 1\right)y_1 =$

A. y

B. $\log y$

C. $-y\log y$

D. $y\log y$

Answer: D

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236. If $x = t \cdot \log t$ and $y = t^t$, then: $\dfrac{dy}{dx} =$

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

B. e^x

C. $\dfrac{y}{xt}$

D. $\log x$

Answer: B

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237. If $x\cos y + y\sin x = \frac{x}{2}$, then $\left(\frac{dy}{dx}\right)$ at $\left(\frac{\pi}{2}, \pi\right)$ is

A. -1

B. 0

C. 1

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

Answer: C

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238. If $3y + \sin(xy) = 4$ then $\left(\frac{dy}{dx}\right)$ at $\left(\frac{\pi}{2}, 1\right)$

A. -1

B. 0

C. 1

D. 2

Answer: B

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239. If $\sec x + \tan y = 1$, then $\left(\frac{dy}{dx}\right)$ at the origin is

A. 0

B. -1

C. 1

D. 2

Answer: A

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240. If f and g are derivable function of x such that $g'(a) \neq 0, g(a) = b$ and $f(g(x)) = x, then' f'(b) =$

A. $\frac{1}{g(a)}$

B. $\frac{1}{g'(a)}$

C. $\frac{1}{g'(b)}$

D. $\frac{1}{f(a)}$

Answer: B

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241. If $x^3 + y^3 = 7$, then $\left(\frac{dy}{dx}\right)$ at $(-1, 2)$ is

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

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

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

D. $\frac{1}{5}$

Answer: C

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242. If $xy^2 = 12$, then $\left(\frac{dy}{dx}\right)$ at $(3 - 2)$ is

A. -1

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

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

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

Answer: D

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243. If $2x^2y^2 - 3xy + 1 = 0$, then $\left(\frac{dy}{dx}\right)$ at $(1, 1)$ is

A. -1

B. 0

C. 1

D. 2

Answer: A

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244. If $xy^4 = 2x^2y^3 - y^{1/3} - 5$ at $\left(\frac{dy}{dx}\right)$ at $(2, 1)$ is

A. $\frac{21}{47}$

B. $-\frac{21}{47}$

C. $-\frac{47}{21}$

D. $\frac{47}{21}$

Answer: B

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245. If $\sqrt{x+y}(x-2y)^2 = 2, \text{ then } \left(\frac{dy}{dx}\right) \text{ at } (3, 1)$ is

A. $\frac{33}{17}$

B. $-\frac{33}{17}$

C. $\frac{17}{33}$

D. $-\frac{17}{33}$

Answer: C

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246. If $y = 3x^2 - 6x$ and $x = g(t)$ is a derivable function such that $g(14) = -2$ and $g'(14) = 8, \text{ then } \left(\frac{dy}{dx}\right)$ at $t = 14$ is

A. 14

B. 114

C. $(- 12)^2$

D. $-(12)^2$

Answer: D

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247. If $y = 3x^2 + 6x$, then $x^2y_2 - 2xy_1 =$

A. $-2y$

B. 2y

C. 0

D. y

Answer: A

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248. If $y = x^2 + x^{-2}$, then $x^2 y_2 + 4xy_1 + 2y =$

A. 0

B. $12x^2$

C. 12x

D. 1

Answer: B

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249. If $y = \frac{x-3}{x-4}$, then $(y-1)y_2 =$

A. $-2y$

B. y_1^2

C. $-2y_1^2$

D. $2(y_1)^2$

Answer: D

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250. If $y = \frac{x^2}{1 - x}$, then $(1 - x)y_2 =$

A. 0

B. 1

C. 2

D. 3

Answer: C

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251. If $y = \frac{(x-1)\left(x^2-2x\right)}{x^4}$ and $\frac{dy}{dx} = \frac{a}{x^2} + \frac{6}{x^3} + \frac{b}{x^4}$, then $(a, b) \equiv$

A. $(1, 6)$

B. $(-1, 6)$

C. $(1, -6)$

D. $(-1, -6)$

Answer: D

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252. If $y = x^2 + 1$ and $u = \sqrt{1 + x^2}$, then: $\frac{dy}{d\,\text{U}} =$

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

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

C. $y = x^2 + 1$ and $u = \sqrt{1 + x^2}$, then $\frac{dy}{dx} =$

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

Answer: C

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253. If $f(x) = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + ...,\ \text{then}\ f'(x) =$

A. $x!$

B. e^x

C. e^{-x}

D. 0

Answer: B

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254. If $y = \frac{\sin^{-1}x}{\cos^{-1}x},\ \text{then}\ \frac{dy}{dx} = \frac{k}{\left(\cos^{-1}x\right)^2\sqrt{1-x^2}},\ \text{where}\ k =$

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

B. 1

C. π

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

Answer: D

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255. Which of the following functions is equal to its own derivative?

A. 1

B. x

C. e^x

D. 0

Answer: D

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256. If $f(0)=0$ and $\lim_{x\to 0}\frac{f(x)}{x}$ exists then this limits is equl to

A. $f'(x)$

B. $f'(0)$

C. $f''(0)$

D. $f(0)$

Answer: B

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257. If $y=\left(\frac{x^a}{x^b}\right)^{a+b}\left(\frac{x^b}{x^c}\right)^{b+c}\left(\frac{x^c}{x^a}\right)^{c+a}$, then $\frac{dy}{dx}$ is equal to

A. 1

B. 0

C. x^{a+b+c}

D. a+b+c

Answer: B

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258. if $f(x) = \log_5 \log_3 x$ then $f'(e)$ is equal to

A. $e \log 5$

B. $-e \log 5$

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

D. $\log(5e)$

Answer: C

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

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

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

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

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

Answer: B

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260. If $g = f^{-1}$ and $f'(x) = \frac{1}{1 + x^3}$, then $g'(x)$ =

A. $1 + [g(x)]^3$

B. $\frac{1}{1 + [g(x)]^3}$

C. $[g(x)]^3$

D. $1+g(3x)$

Answer: A

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261. $\cos^{-1}\sqrt{\dfrac{\sqrt{1+x^2}+1}{2\sqrt{1+x^2}}}$

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

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

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

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

Answer: C

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262. 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. $\frac{\log y}{\tan x}$

Answer: C

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263. If $y = e^{ax}\sin bx$, then $\frac{d^2y}{dx^2} - 2a\frac{dy}{dx} =$

A. $-\left(a^2 + b^2\right)y$

B. $\left(a^2 + b^2\right)y$

C. $-y$

D. $\left(a^2 - b^2\right)y$

Answer: A

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264. Derivative of $\tan^{-1} 2x \dfrac{\sqrt{1 - x^2}}{1 - 2x^2} w.r.t. \sec^{-1} \dfrac{1}{2x^2 - 1}$ at $x = \dfrac{1}{2}$

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

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

C. -1

D. 1

Answer: C

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265. If $y = x - x^2$, then the derivative of $y^2 w.r.t. x^2$ is

A. $2x^2 + 3x - 1$

B. $2x^2 - 3x + 1$

C. $2x^2 + 3x + 1$

D. $2x^2 - 3x - 1$

Answer: B

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266. If $y = \dfrac{ax^2}{(x-a)(x-b)(x-c)} + \dfrac{bx}{(x-b)(x-c)} + \dfrac{c}{x-c} + 1$ then $\dfrac{y'}{y} =$

A. $\dfrac{1}{x}\left(\dfrac{a}{a-x} + \dfrac{b}{b-x} + \dfrac{c}{c-x}\right)$

B. $\dfrac{a}{a-x} + \dfrac{b}{b-x} + \dfrac{c}{c-x}$

C. $\dfrac{1}{x}\left(\dfrac{a}{x-a} + \dfrac{b}{x-b} + \dfrac{c}{x-c}\right)$

D. $\log(x-a) + \log(x-b) + \log(x-c)$

Answer: A

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267. if $p^2 = a^2\cos\theta + b^2\sin^2\theta$ then prove that $\left(p + \frac{d^2p}{d\theta^2}\right) = \frac{a^2b^2}{p^3}$

A. $2a^2 + 2b^2 + 3p$

B. $2a^2 + 2b^2 - 3p$

C. $2a^2 - 2b^2 - 3p$

D. $2a^2 - 2b^2 + 3p$

Answer: B

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268. Let $y = \frac{x^8 + x^4 + 1}{x^4 + x^2 + 1}$. If $\frac{dy}{dx} = ax^3 + bx$. Then,

A. $(4, 2)$

B. $(4, \ -2)$

C. $(\ -2, 4)$

D. `(-2,-4)

Answer: B

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269. If $y = x^{n-1} \log x then x^2 y_2 + (3 - 2n) x y_1$ is equal to $-(n-1)^2 y$ (b) $(n-1)^2 y$ $-n^2 y$ (d) $n^2 y$

A. $-(n-1)^2 y$

B. $(n-1)^2 y$

C. $-n^2 y$

D. $n^2 y$

Answer: A

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270. If $y = \tan^{-1}\left(\frac{\sin x + \cos x}{\cos x - \sin x}\right)$, then $\frac{dy}{dx}$ at $x = \frac{\pi}{4}$

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

B. 0

C. 1

D. 2

Answer: C

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

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

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

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

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

Answer: B

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272. If $y = \log\sqrt{\tan x}$ then $\frac{dy}{dx}$ at $x = \frac{\pi}{4}$ is

A. ∞

B. 1

C. 0

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

Answer: B

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273. If $y = \sqrt{x(\log)_e x}$, then find $\frac{dy}{dx}$ at $x = e$.

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

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

C. $\sqrt{e}$

D. e

Answer: B

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274. Find the derivative to $\sec\left(\tan^{-1}\right)x$ with respect to 'x'

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

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

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

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

Answer: A

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275. 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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276. If $y = \log(\sin x)$, then $\frac{d^2y}{dx^2}$ equals

A. $\sec x \tan x$

B. $-\csc x \cot x$

C. $\sec^2 x$

D. $-\csc^2 x$

Answer: D

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277. If $x = \dfrac{2t}{1 + t^2}, y = \dfrac{1 - t^2}{1 + t^2}$, then $\dfrac{dy}{dx} =$

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

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

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

D. -1

Answer: A

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278. Derivative of $\tan^{-1}\left(\dfrac{\sqrt{1 + x^2} - 1}{x}\right) w.r.t. \tan^{-1}x$ is

A. 1

B. 2

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

D. -2

Answer: C

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

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

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

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

D. 1

Answer: D

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280. Differentiation of $\tan^{-1}\sqrt{\dfrac{1 - x^2}{1 + x^2}}$ w.r.t $\cos^{-1}x^2$ is

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

B. 1

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

D. 2

Answer: C

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

A. $\sqrt{x}$

B. $-\sqrt{x}$

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

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

Answer: C

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282. If $x = a\sin\theta$ and $y = b\cos\theta$, *then* $\frac{d^2y}{dx^2}$ is

A. $\frac{a}{b^2}\sec^2\theta$

B. $\frac{-b}{a}\sec^2\theta$

C. $\frac{-b}{a^2}\sec^3\theta$

D. $\frac{b}{a^2}\sec^3\theta$

Answer: C

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283. f and g differentiable functions of x such that $f(g(x)) = x$, If $g'(a) \neq 0$ and $g(a) = b$, then $f'(b) =$

A. $g(a)$

B. $\frac{1}{g(a)}$

C. $-g'(a)$

D. $\frac{1}{g'(a)}$

Answer: D

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284. If $y = e^{-x^2}$, then $\frac{d^2y}{dx^2}$ vanishes when $x =$

A. $\pm\sqrt{2}$

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

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

D. ± 2

Answer: C

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285. If $y = \log(1 + \sin x)$, then $\frac{d^3y}{dx^3} + \frac{d^2y}{dx^2}\frac{dy}{dx} =$

A. 0

B. $\cot x$

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

D. 1

Answer: A

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286. If $x^2 + xy - y^2 = 1$, then $(x - 2y)^3\frac{d^2y}{dx^2} =$

A. 1

B. 3

C. 5

D. 10

Answer: D

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287. If $x^2 + xy = -y^2 = 1$, then $(x - 2y)^3 \frac{d^2y}{dx^2} =$

A. 0

B. -1

C. -2

D. 1

Answer: C

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288. If $x = ay^2 + by + c$, then $\frac{d^2y}{dx^2} : \left(\frac{dy}{dx}\right)^3 =$

A. a

B. $-2a$

C. 3a

D. $-4a$

Answer: B

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289. If $r = 1 - \cos\theta$, then $r\dfrac{d\theta}{dr} =$

A. $\sec\left(\dfrac{\theta}{2}\right)$

B. $-\csc\left(\dfrac{\theta}{2}\right)$

C. $\tan\left(\dfrac{\theta}{2}\right)$

D. $-\cot\left(\dfrac{\theta}{2}\right)$

Answer: C

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

A. $\cos 2x$

B. $2\cos 2x$

C. $3\cos 2x$

D. $2\cos 3x$

Answer: C

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291. If $y = \frac{x}{a}\cos\left(\frac{a}{x}\right)$, then $x^4\frac{d^2y}{dx^2} =$

A. a^2y

B. $-a^3y$

C. ay

D. $-ay$

Answer: B

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

A. y

B. $-2y$

C. 3y

D. $-4y$

Answer: B

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

A. 0

B. 1

C. e

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

Answer: D

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

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

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

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

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

Answer: C

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295. If $x\cos\theta + y\sin\theta = a$ and $x\sin\theta - y\cos\theta = b$, where θ is a parameter, then $\frac{d^2x}{d\theta^2}\frac{dy}{d\theta} - \frac{d^2y}{d\theta^2}\frac{dx}{d\theta} =$

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

B. $-\left(a^2 + b^2\right)$

C. $-(ax + by)^2$

D. $a^2 - b^2$

Answer: B

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296. If $f(x) = \frac{g(x) - g(a)}{x - a}$, if $x \neq a$

$f(x) = g'(a)$, if $x = a$ then, at $x = a$,

A. f is continuous

B. f is discontinuous

C. f is continuous only if $g'(a) = 0$

D. $f(a) = g(a)$

Answer: A

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297. If $f(x) = (ax + b)\sin x + (cx + d)\cos x$, then the values of a b, c and d such that $f(x) = x\cos x$ for all x, then (a + b + c + d)is

A. $a = d = 1, b = c = 0$

B. $a = c = 1, b = d = 0$

C. $a = b = 1, c = d = 0$

D. $a = b = 1, c = d = 1$

Answer: A

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298. If $f(x) = \left(\frac{a+x}{b+x}\right)^{a+b+2x}$ then prove that $f'(0) = \left[2\log\left(\frac{a}{b}\right) + \frac{b^2 - a^2}{ab}\right]\left(\frac{a}{b}\right)^{a+b}$

A. $\left(\frac{a}{b}\right)^{a+b}\left[2\log\left(\frac{a}{b}\right) + \frac{a^2 - b^2}{ab}\right]$

B. $\left(\frac{a}{b}\right)^{a+b}\left[2\log\left(\frac{a}{b}\right) - \frac{a^2 - b^2}{ab}\right]$

C. $\left(\frac{a}{b}\right)^{a+b}\left[2\log\left(\frac{a}{b}\right) + \frac{a^2 - b^2}{2}\right]$

D. $\left(\frac{a}{b}\right)^{a+b}$

Answer: B

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299. Derivative of $\frac{e^{\tan^{-1}x}}{1+e^{\tan^{-1}x}}$ w. r. t. $e^{\tan^{-1}x}$ is

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

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

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

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

Answer: C

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300. If $y=\tan^{-1}\left[\frac{\log\left(e/x^3\right)}{\log\left(ex^3\right)}\right]+\tan^{-1}\left[\frac{\log\left(e^4x^3\right)}{\log\left(e/x^{12}\right)}\right]$, then $\frac{d^2y}{dx^2}=$

A. -1

B. 0

C. 1

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

Answer: B

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301. A triangle has two vertices at $A(a, 0)$ and $B(0, b)$. Its third vertex C is moving on the line x=y. If S is the area of $\triangle ABC$, then $\dfrac{dS}{dx} =$

A. $\dfrac{a-b}{2}$

B. $\dfrac{a-b}{4}$

C. $\dfrac{a+b}{2}$

D. $\dfrac{a+b}{4}$

Answer: C

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302. If $f\left(tO\cos t - f'(t)\sin t and y = f(t)\sin t + f'(t)\cos t, then\left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2\right.$

$f(t) - f^t$ (b) $\left\{f(t) - f^t\right\}^2$ $\left\{f(t) + f^t\right\}^2$ (d) none of these

A. $[f(t) + f'(t)]^2$

B. $[f(t) - f'(t)]^2$

C. $[f(t) + f'(t)]$

D. $[f(t) + f'(t)]^2$

Answer: A

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303. If $(a - b\tan y)(a + b\tan x) = a^2 + b^2, \ \text{then} \ \frac{dy}{dx} =$

A. 0

B. 1

C. $\tan^{-1}\left(\frac{b}{a}\right)$

D. $\tan^{-1}\left(\frac{b}{a}\right)$

Answer: B

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

A. $\frac{3a^2}{b^4x^6}$

B. $\frac{6a^2}{b^4x^3}$

C. $\frac{3a^2y^5}{b^4x^4}$

D. $\frac{3b^4}{a^2x^4}$

Answer: C

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

A. $\sec a$

B. $-\operatorname{cosec} a$

C. $\tan a$

D. $-\cot a$

Answer: B

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

A. $4y$

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

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

D. $\frac{1}{4y}$

Answer: D

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

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

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

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

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

Answer: A

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308. If $y = \frac{3x - x^3}{1 - 3x^2}$, then $\frac{dy}{dx} =$

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

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

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

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

Answer: C

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309. If $\cot^{-1}x + \cot^{-1}y = \cot^{-1}c$, then $\frac{dy}{dx} =$

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

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

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

D. $\frac{y+c}{c+y}$

Answer: B

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310. If $\log\left(\frac{x+y}{3}\right)=\frac{1}{2}(\log x+\log y)$, then $\frac{dy}{dx}=$

A. $\frac{5y-2x}{2y-5x}$

B. $\frac{7x-2y}{2x-7y}$

C. $\frac{7y-2x}{2y-7x}$

D. $\frac{7x+2x}{2x+7y}$

Answer: C

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311. If r is the radius of the circle $x^2+y^2+2gx+2fy+c=0$, then: $(y+f)^3\frac{d^2y}{dx^2}=$

A. $-r^2$

B. r^2

C. g^2+f^2-r

D. r^3

Answer: A

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312. Derivative of $\sin\left(3\sin^{-1}x\right)+\cos\left(3\cos^{-1}x\right)w.r.t.x$ is equal to

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

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

C. 0

D. 1

Answer: C

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313. If $y=\sec 4x$ and $t=\tan x$, then $\left(1-6t^2+t^4\right)^2\dfrac{dy}{dx}=$

A. $16t\left(1 = -t^4\right)$

B. $61t\left(t^4 - 1\right)$

C. $61t\left(t^4 + 1\right)$

D. $16t\left(1 + t^4\right)$

Answer: A

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314. If S_n is the sum of a G.P. to n terms of which r is the common ratio, then : $(r-1) \cdot \frac{d}{dr}\left(S_n\right) + nS_{n-1} =$

A. nS_{n-1}

B. $(n-1)S_n$

C. $n(S)_n$

D. $n \cdot S_{n+1}$

Answer: B

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315. If $y = x^{x^{x^{\dots \infty}}}$, then $x(1 - y\log x)\dfrac{dy}{dx}$

A. y

B. $-y$

C. $-y^2$

D. y^2

Answer: D

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316. If $x = t\log t, y = t^t$, then $\dfrac{d^2y}{dx^2} =$

A. $\log t$

B. tx^{t-1}

C. e^2

D. e^t

Answer: C

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317. $\frac{d}{dx}\left[\cos^2 x\left(3 - 4\cos^2 x\right)^2\right] + \frac{d}{dx}\left[\sin^2\left(3 - 4\sin^2 x\right)^2\right] =$

A. $\cos x + \sin x$

B. $\cos 3x + \sin 3x$

C. 1

D. 0

Answer: D

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318. If $y = \frac{1}{a}\tan^{-1}\left(\frac{x}{a}\right) - \frac{1}{b}\tan^{-1}\left(\frac{x}{b}\right)$, then $\frac{dy}{dx} =$

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

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

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

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

Answer: C

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319. If $\frac{d}{dx}\left[\cot^{-1}(x+1)\right] + \frac{d}{dx}\left(\tan^{-1}x\right) = \frac{d}{dx}\left(\tan^{-1}u\right)$, then $u =$

A. $2x + 1$

B. $x^2 + x + 1$

C. $x^2 + 2x + 1$

D. 2x

Answer: B

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

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

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

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

D. 0

Answer: D

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321. If $e^y = \dfrac{\sqrt{1+x}+\sqrt{1-x}}{\sqrt{1+x}-\sqrt{1-x}}$, then $\dfrac{dy}{dx} =$

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

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

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

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

Answer: C

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322. If $f(x) = \log_2\left[\log_3\left(\log_5 x\right)\right]$, then $f'(125) =$

A. $\dfrac{1}{125\log 2\log 3\log 5}$

B. $\dfrac{1}{375\log 2\log 3\log 5}$

C. $\dfrac{1}{500\log 2\log 3\log 5}$

D. $\dfrac{1}{250\log 2 \log 3 \log 5}$

Answer: B

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323. If $y = \sqrt{\tan x + \sqrt{\tan x + \sqrt{\tan + \ldots \text{ to } \infty}}}$, then $\dfrac{dy}{dx} =$

A. $\dfrac{\sec^2 x}{2yx}$

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

C. $\dfrac{\sec^2 x}{2y + 1}$

D. $\dfrac{\csc^2 x}{2y + 1}$

Answer: A

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324. If $\log(xy)x^2 + y^2$, then: $\left(\dfrac{dy}{dx}\right)\left(\dfrac{dx}{dy}\right) =$

A. 0

B. 1

C. -1

D. 2

Answer: B

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325. Derivative fo $\tan^{-1}\left(\frac{\sin x}{1+\cos x}\right)w.r.t.\tan^{-1}\left(\frac{\cos x}{1+\sin x}\right)$ is

A. -1

B. 0

C. 1

D. 2

Answer: A

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326. Derivative of $\tan^{-1}\left(\frac{2t}{1-t^2}\right) w.r.t \sin^{-1}\left(\frac{2t}{1+t^2}\right)$ is

A. 0

B. 1

C. -1

D. 2

Answer: B

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327. Derivative of $\cos^{-1}\left[\frac{1}{\sqrt{t^2+1}}\right] w.r.t \sin^{-1}\left[\frac{t}{\sqrt{t^2+1}}\right]$ is

A. 0

B. 1

C. $\dfrac{t}{\sqrt{t^2+1}}$

D. $\dfrac{2t^2}{\left(t^2+1\right)^{3/2}}$

Answer: B

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328. Derivative of $\dfrac{\sin^{-1}}{1+\sin^{-1}x} w.r.t. \sin^{-1}x$ is

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

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

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

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

Answer: C

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329. Derivative of $\tan^{-1}\sqrt{\frac{1-x}{1+x}} = w.r.t. \cos^{-1}x$ is

A. 2

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

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

D. 1

Answer: C

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330. If f is a differentiable function of x such that $f(1)=0, f'(1)=\frac{3}{5}$ and $y=e^{x}\cdot f\left(e^{2x}\right)$, then the value of $\frac{dy}{dx}$ at $x=0$ is

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

B. $\frac{3}{5}$

C. $\frac{6}{5}$

D. 1

Answer: C

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331. If $y = f(\cos x)$ and $f'(x) = \cos^{-1} x$, then $\frac{dy}{dx} =$

A. $x\sin x$

B. $-x\sin x$

C. $x\cos x$

D. $-x\cos x$

Answer: B

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332. If $xy(x+y) = k$, then: $x(x+2y)\frac{dy}{dx} =$

A. $y(2x + y)$

B. $y(2x - y)$

C. $-y(2x + y)$

D. $y(y - 2x)$

Answer: C

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333. If $e^{xy} - 4xy = 2, \text{ then } \frac{dy}{dx} =$

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

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

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

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

Answer: D

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334. If $\sqrt{xy} = 1$, then $\frac{dy}{dx} =$

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

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

C. $-x^2$

D. x^2

Answer: A

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335. If $x^2 = 1 + \cos y$, then: $\frac{dy}{dx} =$

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

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

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

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

Answer: B

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336. If $3\sin(xy) + 4\tan(xy) = 7, \text{ then } \frac{dy}{dx} =$

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

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

C. 0

D. 7xy

Answer: A

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337. $Ify = 2\sin^{-1}\sqrt{1 - x} + \sin^{-1}\left[2\sqrt{x(1 - x)}\right]$ is real , then $\frac{dy}{dx} =$

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

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

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

D. 0

Answer: D

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338. If $x = t + \frac{1}{t}, y = t - \frac{1}{t}$, where $t \neq 0$, then: $\frac{d^2y}{dx^2} =$

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

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

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

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

Answer: B

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

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

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

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

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

Answer: C

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340. If $y^2 - 2x^2 = y$, then $\left[\frac{dy}{dx}\right]_{(1, -1)}$ is equal to

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

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

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

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

Answer: A

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341. If $f(a) = 2, f'(a) = 1, g(a) = -1, g'(a) = 2,$ then the value of $\lim_{x \to a} \frac{g(x)f(a) - g(a)f(x)}{x - a}$, is

A. -5

B. 0

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

D. 5

Answer: D

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342. Find $\frac{dy}{dx}$, when $x = \frac{\cos^{-1}1}{\sqrt{1+t^2}}$ and $y = \frac{\sin^{-1}t}{\sqrt{1+t^2}}, \quad t \in R$

A. -2

B. -1

C. 1

D. 2

Answer: C

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343. If $f(x) = \sin(\cos x)$, then $f'(x)$ is equal to

A. $\cos(\cos x)$

B. $\sin(-\sin x)$

C. $-\sin(\cos x)$

D. $-\sin x \cdot \cos(\cos x)$

Answer: D

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344. If $y = 3x - \frac{1}{2}\cos x,\ \text{ then: } \frac{d^2x}{dy^2} =$

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

B. $\frac{-4\cos x}{(6 + \sin x)^2}$

C. $\frac{-4\cos x}{(6 + \sin x)^3}$

D. $\frac{-4\sin x}{(6 + \sin x)^3}$

Answer: C

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

B. 2

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

D. -2

Answer: A

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346. If $x^{mx^{mx^{mx \ldots \text{to} \infty}}} = y^{ny^{ny^{ny \ldots \text{to} \infty}}}$, then $\frac{dy}{dx} =$

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

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

C. $\frac{my}{nx}$

D. $\frac{ny}{mx}$

Answer: C

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347. If $y=\frac{1-\cos x}{1+\cos x}$, then: $\frac{dy}{dx}=$

A. $\sec^2 x$

B. $\tan x \sec^2 x$

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

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

Answer: C

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

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

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

Answer: C

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349. If $x = \frac{a}{1+m^3}, y = \frac{am}{1+m^3}$, then: $\frac{dy}{dx} =$

A. $\frac{2m^3 - 1}{m^2}$

B. $\frac{2m^3 + 1}{3m^2}$

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

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

Answer: C

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350. Deriative of $\log_{10} x w.r.t \log_x 10$ is

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

B. $\dfrac{\left(\log_x 10\right)^2}{(\log 10)^2}$

C. $-\dfrac{\left(\log_x 10\right)^2}{(\log 10)^2}$

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

Answer: A

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351. If $e^y + xy = e$, then: $\left[\dfrac{d^2y}{dx^2}\right]_{x=0}$ is equal to

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

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

C. $\dfrac{1}{e^3}$

D. e^3

Answer: B

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

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

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

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

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

Answer: A

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

A. not defined for al real x

B. continuous at x=0

C. not differentiable for all real x

D. such that $\frac{dy}{dx} = \frac{1}{3}$ for $y < 0$

Answer: D

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354. If $y = t^2 - t + 1$, then: $\frac{dy}{dx} =$

A. $2t + 1$

B. $t^2 + t - 1$

C. 0

D. not defined

Answer: D

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355. If $x = t^2 y = t^3, then \dfrac{d^2y}{dx^2} = \dfrac{3}{2}$ (b) $\dfrac{3}{(4t)}$ (c) $\dfrac{3}{2(t)}$ (d) $\dfrac{3t}{2}$

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

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

C. $\dfrac{3}{2t}$

D. $\dfrac{3t}{2}$

Answer: B

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356. If $y = a + bx^2, \text{ then:}$

A. $y_2 = 2x$

B. $xy_2 = y_1$

C. $xy_2 = y_1 + y = 0$

D. $xy_2 = 2xy$

Answer: B

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357. 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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358. If $x > 0$ and $x = e^{x+y}$, then: $\frac{dy}{dx} =$

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

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

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

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

Answer: A

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359. If $f(x) - 4x^8$, then

A. $f\left(\frac{1}{2}\right) = f'\left(-\frac{1}{2}\right)$

B. $f\left(-\frac{1}{2}\right) = f'\left(\frac{1}{2}\right)$

C. $f'\left(\frac{1}{2}\right) = f'\left(-\frac{1}{2}\right)$

D. $f\left(\frac{1}{2}\right) = f'\left(\frac{1}{2}\right)$

Answer: B

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360. If $G(x) = -\sqrt{25 - x^2}$, find the value of $\lim (x \to 1)\frac{G(x) - G(1)}{x - 1}$

A. $\frac{3}{\sqrt{24}}$

B. $\frac{1}{\sqrt{24}}$

C. $-\frac{1}{\sqrt{24}}$

D. $2\sqrt{6}$

Answer: B

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

A. 1

B. -1

C. x

D. $\sqrt{x}$

Answer: B

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362. $\dfrac{1}{1 + x^{b-a} + x^{c-a}} + \dfrac{1}{1 + x^{a-b} + x^{c-b}} + \dfrac{1}{1 + x^{a-c} + x^{b-c}}$ equals

A. 0

B. 1

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

D. -1

Answer: A

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363. If $f(x) = \frac{1 - \cos x}{1 - \sin x}$, then: $f'\left(\frac{\pi}{2}\right)$ is

A. 1

B. 0

C. ∞

D. indeterminate

Answer: D

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

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

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

C. 0

D. 1

Answer: B

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365. If

$$y = \tan\left[\frac{1}{2}\cos^{-1}\left(\frac{1-u^2}{1+u^2}\right) + \frac{1}{2}\sin^{-1}\left(\frac{2u}{1+u^2}\right)\right] \text{ and } x = \frac{2u}{1-u^2}, \text{ then: } \frac{dy}{dx} =$$

A. -1

B. 0

C. 1

D. 2

Answer: C

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366. The derivative of $f(\tan x) w.r.t. g(\sec x)$ at $x = \frac{\pi}{4}$, where $f'(1) = 2$ and $g'\left(\sqrt{2}\right) = 4$, is

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

B. $\sqrt{2}$

C. 1

D. -1

Answer: A

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367. Let $y = x^3 - 8x + 7 and x = f(t) I \frac{\cdot f(dy)}{dx} = 2 and x = 3a = 0$, then find the value of $\frac{dx}{dt} a = 0$.

A. 1

B. $\frac{19}{2}$

C. $\frac{2}{19}$

D. 38

Answer: C

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368. Given

$f'(x) = g(x)$ and $g'(x) = f(x)$. Also, $f(3) = 5$ and $f'(3) = 4$. Then, the value of: [

A. 0

B. 9

C. 41

D. 23

Answer: B

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369. If $y = x^x \cdot b^{2x-1}$, then: $\dfrac{d^2y}{dx^2} =$

A. $y^2 \cdot \log ab2$

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

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

D. y^2

Answer: C

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370. If $y^2 - 2x^2 = y$, then: $\left[\dfrac{dy}{dx^2}\right]_{(1,-1)}$ is equal to

A. $-\dfrac{4}{3}$

B. $\dfrac{4}{3}$

C. $\dfrac{3}{4}$

D. $-\dfrac{3}{4}$

Answer: A

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371. If $f(x) = \sin(\cos x)$, then $f'(x)$ is equal to

A. $\cos(\cos x)$

B. $\sin(-\sin x)$

C. $-\sin(\cos x)$

D. $-\sin x \cdot \cos(\cos(\cos x))$

Answer: D

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372. If f''(x) =- f(x) and g(x) = f'(x) and $F(x) = \left(f\left(\frac{x}{2}\right)\right)^2 + \left(g\left(\frac{x}{2}\right)\right)^2$

and given that F(5) =5, then F(10) is

A. 5

B. 10

C. 0

D. 15

Answer: A

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373. If $y = e^{1 + \log x}$, then: $\frac{dy}{dx}$

A. e

B. 1

C. 0

D. $\log x \cdot e^{\log ex}$

Answer: A

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

A. 0

B. 1

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

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

Answer: C

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

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

Answer: B

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376. Given$f(x) = ax^2 + b, \quad \text{if } x < -1$

$= bx^2 + ax + 4, \quad \text{if } x \geq -1$

If the derivartive of $f(x)$ is continuous everywhere in R, then :$(a, b) \equiv$

A. $(2, 3)$

B. $(3, 2)$

C. $(-2, -3)$

D. $(-3, -2)$

Answer: A

Watch Video Solution

377. Differentiation of $x^x w.r.t. x \cdot \log x$ is

A. $1 + \log x$

B. $x^x \cdot \log x$

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

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

Answer: C

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378. If $y = \sin^{-1}(x - y), x = 3t, y = 4t^3$, then what is the derivative of u with respect to t?

A. $3\left(1 - t^2\right)$

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

C. $5(1 - t)^{1/2}$

D. $5\left(1 - t^2\right)$

Answer: B

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379. Let $f(x) = \frac{1}{\sqrt{18 - x^2}}$ The value of $Lt_{x \to 3} \frac{f(x) - f(3)}{x - 3}$ is

A. 0

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

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

D. $\frac{1}{9}$

Answer: D

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380. If $y = x + e^x, \text{ then: } \frac{d^2y}{sx^2} =$

A. e^x

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

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

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

Answer: B

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381. State which one of the following statements is false:

A. If f is continuous at $y = a, \text{ then } \lim_{y \to a} f(y) = f(a)$.

B. If $\lim_{x \to a} f(x)$ exists, then $f(x)$ is continuous ta x=a.

C. If $f(x)$ is differentiable at x=a, then it is continuous at x=a.

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

Answer: B

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382. If $\sqrt{x}+\sqrt{y}=\sqrt{a}$, then y_2 at $x=a$ is

A. a

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

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

D. $\sqrt{a}$

Answer: B

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383. If $f(x)>0$ and differentiable in R, then :$f'(x)=$

A. $f(x)\cdot\frac{d}{dx}\left[e^{f(x)}\right]$

B. $f(x)\cdot\frac{d}{dx}\left[e^{\log f(x)}\right]$

C. $f(x)\cdot\frac{d}{dx}[\log f(x)]$

D. $e^{f(x)}$

Answer: C

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384. If $f(x) = x \cdot \tan^{-1}x$, then: $f'(1) =$

A. $\frac{\pi}{4} + \frac{1}{2}$

B. $\frac{\pi}{4} - \frac{1}{2}$

C. $\frac{1}{2} - \frac{\pi}{4}$

D. $-\frac{\pi}{8}$

Answer: A

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385. If $y = \sin^{-1}x, z = \cos^{-1}\sqrt{1 - x^2}$, then: $\frac{dy}{dz} =$

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

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

C. 1

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

Answer: C

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386. If $f(x) = \dfrac{1}{3x + 1}$, then: $f'(0)$

A. vanishes

B. is positive

C. is negative

D. does not exist

Answer: C

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387. Differential co-eficient of $\log(\log x) w.r.t. \log x$ is

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

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

C. $\dfrac{x}{\log x}$

D. $\dfrac{1}{\log x}$

Answer: D

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388. If $e^y + xy = e, \text{ then } y_2 \text{ at } x = 0$ is

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

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

C. $\dfrac{1}{e^3}$

D. 1

Answer: B

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389. If $x = \sqrt{\dfrac{1 - t^2}{1 + t^2}}$ and $y = \dfrac{\sqrt{1 + t^2} - \sqrt{1 - t^2}}{\sqrt{1 + t^2} + \sqrt{1 - t^2}}$ then $\dfrac{d^2y}{dx^2} =$

A. 0

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

C. -1

D. 1

Answer: A

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390. If $\sqrt{y - \sqrt{y - \sqrt{y - \ldots\ldots till\infty}}} = \sqrt{x + \sqrt{x + \sqrt{x + \ldots\ldots\ldots till\infty}}}$ then $\frac{dy}{dx} =$

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

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

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

D. 1

Answer: B

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391. If $x = 2t + 3t^2, y = t^2 + 2t^3,\ \text{then:}\ \left(y_1\right)^2 + 2\left(y_1\right)^3 =$

A. 4y

B. 3y

C. 2y

D. y

Answer: D

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392. If $y = x \cdot \tan y, \quad \text{then: } \frac{dy}{dx} =$

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

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

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

D. $\frac{\tan y}{x + x^2 + y^2}$

Answer: B

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393. If $\sin(x + y) = \log(x + y), \quad \text{then: } \frac{dy}{dx} =$

A. $\tan(x + y)$

B. $\log(x+y)$

C. -1

D. 1

Answer: C

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394. If

$f(a)=a^2, \phi(a)=b^2$ and $f'(a)=n\cdot\phi'(a)$, then: $\lim_{x\to a}\frac{\sqrt{f(x)}-a}{\sqrt{\phi(x)}-b}=$

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

B. $n\frac{b}{a}$

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

D. $n\frac{a}{b}$

Answer: B

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395. If x is in degrees, then: $\frac{d}{dx}(\cos x) =$

A. $-\sin x$

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

C. $\frac{\pi}{180}\cdot\sin x$

D. $-\frac{\pi}{180}\cdot\sin x$

Answer: D

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396. If $pv = 81, \text{ then } \frac{dp}{dv} \text{ at } v = 9$ is equal to

A. 1

B. -1

C. 2

D. $\sqrt{9}$

Answer: B

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397. If $x^y = y^x$ then $\frac{dy}{dx} = ?$

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

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

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

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

Answer: C

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398. For the curve $\sqrt{x} + \sqrt{y} = 1$, $\frac{dy}{dx}$ at $\left(\frac{1}{4}, \frac{1}{4}\right)$ is

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

B. 1

C. -1

D. 2

Answer: C

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

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

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

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

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

Answer: A

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400. If $y = \sqrt{x} + \frac{1}{\sqrt{x}}$, then: $2x\frac{dy}{dx} + y =$

A. $\sqrt{x}$

B. $\sqrt{x}$

C. $3\sqrt{x}$

D. $\frac{3}{\sqrt{x}}$

Answer: B

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401. If $y = \sqrt{\frac{x}{a}} + \sqrt{\frac{a}{x}}$, then: $2xy\frac{dy}{dx} =$

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

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

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

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

Answer: A

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

A. $-3y$

B. 2y

C. $-y$

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

Answer: C

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403. If $y=\sqrt{x+1}+\sqrt{x-1}$, then: $2\sqrt{x^2-1}\cdot\frac{dy}{dx}=$

A. $\frac{y}{4}$

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

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

D. y

Answer: C

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404. If $y = \log\left[(x-1)^{x-1}\right] - \log\left[(x+1)^{x+1}\right]$, then: $\frac{dy}{dx} =$

A. $\log\left(\frac{1+x}{1-x}\right)$

B. $\log\left(\frac{1-x}{1+x}\right)$

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

D. $\log\left(\frac{1-y}{1+x}\right)$

Answer: A

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

A. $y^2 + 4$

B. $\sqrt{y^2 + 4}$

C. $y^2 - 4$

D. $\sqrt{y^2 - 4}$`

Answer: D

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406. If $2x = y^{1/m}$, then: $\frac{dy}{dx} =$

A. m^2y^2

B. m^2y

C. $-m^2y^2$

D. $-m^2y$

Answer: A

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407. If $xy^2 = 1, provethat2\frac{dy}{dx} + y^3 = 0$

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

B. x^2y

C. 0

D. $2x^3$

Answer: C

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408. If $x = t \cdot \log t, y = \frac{\log t}{t}$, then the value of $\frac{dy}{dx}$ at $t = 1$ is

A. 1

B. e

C. 0

D. $1 + \log t$

Answer: A

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409. Differentiate $x = \frac{1 + \log t}{t^2}, y = \frac{3 + 2\log t}{t}$

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

B. $e^{\log t}$

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

D. $\frac{6t}{(1 + \log t)^2}$

Answer: B

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

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

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

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

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

Answer: A

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411. If $(x - y)e^{\frac{x}{x-y}} = a$; then $y\frac{dy}{dx} + x$ is

A. y

B. 2y

C. 3y

D. 4y

Answer: B

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412. If $x^m \cdot y^n = (x+y)^{m+n}$, then: $\frac{dy}{dx}$ is independent of

A. m

B. n

C. both m and n

D. x and y

Answer: C

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413. If $x^3 = (x+y)^n \cdot y^2$ and $\frac{dy}{dx} = \frac{y}{x}$, then: $n =$

A. 1

B. 2

C. 3

D. 5

Answer: A

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

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

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

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

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

Answer: C

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415. If $y = \cos 2x \cdot \sin 3x$, then $\frac{d^2y}{dx^2} =$

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

B. $-\frac{1}{2}(25\sin 5x - \sin x)$

C. $\frac{1}{2}(25\cos 5x - \sin x)$

D. $-\frac{1}{2}(25\sin 5x + \sin x)$

Answer: D

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416. If $y = \cos\left(2\cos^{-1}x\right)$, then $y'' =$

A. 3

B. 4

C. 1

D. 0

Answer: B

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

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

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

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

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

Answer: A

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

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

B. $\dfrac{3}{x^2 \cdot \sin\left[\frac{\cos^{-1}(1)}{x^3}\right)}$

C. $\dfrac{3}{x\sqrt{x^6 - 1}}$

D. $\dfrac{-3}{x\sqrt{x^6 - 1}}$

Answer: C

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419. If $y = \sqrt{\frac{x+1}{x+2}}$, then $\frac{dy}{dx}$ at $x = 0$ equals

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

B. $\sqrt{2}$

C. $2\sqrt{2}$

D. $1/4\sqrt{2}$

Answer: D

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420. If $y = (1 - x)^4$, then $y' =$

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

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

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

D. $-4\left(x^3 - 3x^2 + 3x - 1\right)$

Answer: B

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421. If $x = \theta - \frac{1}{\theta}$ and $y = \theta + \frac{1}{\theta}$, then: $\frac{d^2y}{dx^2} =$

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

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

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

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

Answer: D

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422. If $\frac{x}{y} + \frac{y}{x} = 2$, then: $\frac{d^2y}{dx^2} =$

A. 1

B. -1

C. 0

D. 2x

Answer: C

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423. If $y = x + \frac{1}{x+y}$, then: $\frac{dy}{dx} =$

A. y/x

B. x/y

C. $-x/y$

D. $-y/x$

Answer: B

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424. If $y = x + \frac{1}{x} + x^2 + \frac{1}{x^2}$ and $\frac{d^2y}{dx^2} = 1 + c + \frac{2}{x^3} + \frac{6}{x^4}$, then $c =$

A. 0

B. 1

C. -1

D. 2

Answer: B

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425. If $\frac{d}{dx}[f(x)] = \frac{1}{1+x^2}$, then: $\frac{d}{dx}\left[f\left(x^3\right)\right] =$

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

B. $\frac{3x^2}{1+x^6}$

C. $\frac{-6x^5}{\left(1+x^6\right)^2}$

D. $\frac{-6x^5}{1+x^6}$

Answer: B

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426. $\frac{d}{dx}\left[\tan^{-1}\left(\frac{ax-b}{bx+a}\right)\right]=$

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

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

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

D. none of theses

Answer: D

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427. $\frac{d}{dx}\left[\tan^{-1}\sqrt{\frac{1+\frac{\cos x}{2}}{1-\frac{\cos x}{2}}}\right)$

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

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

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

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

Answer: A

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

A. $\sec^2 x$

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

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

D. none of theses

Answer: B

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429. If : $y = \sqrt{(1 - x)(1 + x)}$, then:

A. $\left(1 - x^2\right) \cdot \dfrac{dy}{dx} - xy = 0$

B. $\left(1 - x^2\right) \cdot \dfrac{dy}{dx} + xy = 0$

C. $\left(1 - x^2\right) \cdot \dfrac{dy}{dx} - 2xy = 0$

D. $\left(1 - x^2\right) \cdot \dfrac{dy}{dx} + 2xy = 0$

Answer: B

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430. If : $f(x) = x \cdot \tan^{-1}x$, then: $f'(1) =$

A. $1 + \dfrac{\pi}{4}$

B. $\dfrac{1}{2} + \dfrac{\pi}{4}$

C. $\dfrac{1}{2} - \dfrac{\pi}{4}$

D. 2

Answer: B

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431. Find the differentiation of $\log\left(\sqrt{x-a}+\sqrt{x-b}\right)$ w.r.t. x

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

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

C. $\dfrac{1}{\sqrt{x-a\sqrt{x-b}}}$

D. none of these

Answer: B

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432. If $y = \frac{\sqrt{a+x} - \sqrt{a-x}}{\sqrt{a+x} + \sqrt{a-x}}$, $then \frac{dy}{dx} isequa < o$ $\frac{ay}{x\sqrt{a^2 - x^2}}$ (b) $\frac{ay}{\sqrt{a^2 - x^2}}$ $\frac{ay}{x\sqrt{a^2 - x^2}}$ (d) none of these

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

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

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

D. none of theses

Answer: A

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

A. $2\sec 2x \cdot \tan 2x$

B. $\sec 2x \cdot \tan 2x$

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

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

Answer: D

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434. Let $f(x) = (x - 7)^2, x \in [2, 7]$. the value of $\theta \in (2, 7)$ such that $f'(\theta) = 0$ is equal to

A. $49/4$

B. $53/9$

C. $53/7$

D. $49/9$

Answer: B

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

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

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

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

D. none of theses

Answer: A

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

A. $4 \cdot \csc 2x \cdot \cot 2x$

B. $-4 \cdot \csc 2x \cdot \cot 2x$

C. $-4 \cdot \csc x \cdot \cot 2x$

D. none of theses

Answer: B

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437. $\frac{d}{dx}\left(\frac{\sec x + \tan x}{\sec x - \tan x}\right) =$

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

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

C. $\frac{2 \cdot \cos x}{(1 - \sin x)}$

D. none of theses

Answer: A

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

A. $\csc x$

B. $\tan x$

C. $\cos x$

D. $\sec x$

Answer: D

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439. $\frac{d}{sx}\left[\log\left(\sqrt{\frac{1 - \cos x}{1 + \cos x}}\right)\right] =$

A. $\sec x$

B. $\csc x$

C. $\csc\frac{x}{2}$

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

Answer: B

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440. If :$y = \sqrt{\frac{1 + e^x}{1 - e^x}}$, then: $\frac{dy}{dx} =$

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

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

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

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

Answer: A

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441. let $f(x)$ be a polynomial function of second degree. If $f(1) = f(-1)$ and a_1, a_2, a_3 are in AP, then show that $f'\left(a_1\right), f'\left(a_2\right), f'\left(a_3\right)$ are in AP.

A. A.P

B. G.P.

C. H.P.

D. none of theses

Answer: A

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

A. 0

B. 1

C. -1

D. -2

Answer: D

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443. If $y = \frac{\sin^{-1}x}{\sqrt{1 - x^2}}$, *then* $\frac{\left(1 - x^2\right)dy}{dx}$ is equal to $x + y$ (b) $1 + xy$ $1 - xy$ (d) $xy - 2$

A. x+y

B. 1+xy

C. 1-xy

D. xy-2

Answer: B

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444. If : $f(x) = e^{x^2}$, then: $f'(x) - 2x \cdot f(x) + \frac{1}{3} \cdot f(0) - f'(0) =$

A. 0

B. 1

C. $\frac{7}{3} \cdot e^{x^2}$

D. none of theses

Answer: B

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445. If : $y = (x+1)(x+2)(x+3)(x+4)(x+5)$, then: $\frac{dy}{dx}$ at $x = 0$ is

A. 274

B. 742

C. 472

D. 247

Answer: A

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446. Values of x, at which the first derivative of the function $\left(\sqrt{x}+\frac{1}{\sqrt{x}}\right)^2 w.r.t.\, x$ is $\frac{3}{4}$, are

A. ± 2

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

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

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

Answer: A

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

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

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

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

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

Answer: A

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448. 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. $2/3$

B. $3/2$

C. 2

D. 0

Answer: C

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

A. $\sec 2x \cdot \tan x$

B. $\tan 3x \cdot \tan x$

C. $\sec^2 x$

D. $\sec x \cdot \tan x$

Answer: C

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450. If : $y = \left(1 + x^2\right) \cdot \tan^{-1} x - x, \quad \text{then: } \frac{dy}{dx} =$

A. $\tan^{-1}$

B. $2x \cdot \tan^{-1} x$

C. $2x \cdot \tan^{-1}x - 1$

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

Answer: B

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

A. $\sqrt{2}$

B. $1/\sqrt{3}$

C. 0

D. $-\sqrt{2}$

Answer: C

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452. If $y=\frac{1}{4}u^4$, $u=\frac{2}{3}x^3+5$, then $\frac{dy}{dx}=$

A. $\frac{1}{27}x^2(2x^3+15)^3$

B. $\frac{2}{27}x^2(2x^3+5)^3$

C. $\frac{2}{27}x^2(2x^3+15)^3$

D. none of theses

Answer: C

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453. If : $y=2^{1/(\log_x 4)}$, then: $\frac{dy}{dx}=$

A. y

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

C. 2y

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

Answer: D

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454. If $y=\sqrt{\dfrac{(x-a)(x-b)}{(x-c)(x-d)}}$, then $\dfrac{dy}{dx}$ is equal to

A. $\dfrac{y}{2}\left[\dfrac{1}{x-a}+\dfrac{1}{x-b}-\dfrac{1}{x-c}-\dfrac{1}{x-d}\right]$

B. $y\left[\dfrac{1}{x-a}+\dfrac{1}{x-b}-\dfrac{1}{x-c}-\dfrac{1}{x-d}\right]$

C. $\dfrac{1}{2}\left[\dfrac{1}{x-a}+\dfrac{1}{x-b}-\dfrac{1}{x-c}-\dfrac{1}{x-d}\right]$

D. none of theses

Answer: A

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

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

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

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

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

Answer: A

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456. $\dfrac{d}{dx}\left[\cos^{-1}\sqrt{\dfrac{1+x^2}{2}}\right.=$

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

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

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

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

Answer: C

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

A. $-y/x$

B. 0

C. -1

D. 1

Answer: C

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458. If : $3f(x)-2f\left(\frac{1}{x}\right)=x$, then: $f'(2)=$

A. $2/7$

B. $1/2$

C. 2

D. $7/2$

Answer: B

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459. Defferential Coefficient of $\sin^{-1}\frac{1-x}{1+x} w.r.t.\sqrt{x}$ is

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

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

C. 1

D. none of theses

Answer: D

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

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

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

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

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

Answer: A

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461. If $u = \tan^{-1}\left\{\frac{\sqrt{1+x^2}-1}{x}\right\}$ and $v = 2\tan^{-1}x$, then $\frac{du}{dv}$ is equal to......

A. 4

B. 1

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

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

Answer: C

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462. Derivative of $\tan^{-1}\left\{\frac{x}{1+\sqrt{1-x^2}}\right\} w.r.t. \sin^{-1}$ is

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

B. 1

C. 2

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

Answer: A

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463. If :

$f'(1) = 2$ and $g'\left(\sqrt{2}\right) = 4$, then: derivative of $f(\tan x) w.r.t. g(\sec x)$ at $x = \pi/4$, is

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

B. $\sqrt{2}$

C. 1

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

Answer: A

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464. If : $x = \log t$ and $y = \frac{1}{t}$ then :

A. $\frac{d^2y}{dx^2} - 2t = 0$

B. $\frac{d^2y}{dx^2} + Y = 0$

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

D. $\frac{d^2y}{dx^2} - \frac{dy}{dx} = 0$

Answer: C

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465. 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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466. $\dfrac{d^2x}{dy^2} =$

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

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

C. $\dfrac{1}{\left(d^2y/dx^2\right)}$

D. $\dfrac{-d^2y/dx^2}{(dy/dx)^3}$

Answer: D

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467. $\dfrac{d^2}{dx^2}(2\cos x \cdot \cos 3x) =$

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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468. If : $f(x) = x - 5, \quad ...x \le 1$

$= 4x^2 - 9, \quad ...1 < x < 2$

$= 3x + 4, \quad ...x \ge 2,$

then : $f'\left(2^+\right) =$

A. 0

B. 2

C. 3

D. 4

Answer: C

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469. If $y = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} .... \frac{x^n}{n!}$

A. y

B. y^2

C. e^y

D. $\frac{y^n}{n!}$

Answer: A

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470. Let $f(x)$ then $g(x)$ be two functions having finite non-zero third order derivatives.

If : $f(x) \cdot g(x) = 1, \quad \text{for all } x \in R, \quad \text{then: } \frac{f''}{f} - \frac{g''}{g'} =$

A. $\frac{f'}{f} - \frac{g''}{g}$

B. $\left(\frac{f'}{f} - \frac{g''}{g}\right)$

C. $3\left(\frac{f''}{f} - \frac{g''}{g}\right)$

D. none of theses

Answer: C

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471. Suppose $f(x) = e^{ax} + e^{bx}$, where $a \neq b$, and that f''(x) -2f'(x)-15f(x)=0 for all x. Then the product ab is

A. 25

B. 9

C. -15

D. -9

Answer: C

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472. If $y = \tan^{-1}\left(\frac{2^x}{1 + 2^{2x+1}}\right), then \frac{dy}{dx} at x = 0$ is 1 (b) 2 (c) 1n 2 (d) none of these

A. 1

B. 2

C. In2

D. none of theses

Answer: D

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473. Let : $y = f(x) - f(2x)$ and $z = f(x) - f(4x)$.

If : $y'(1) = 5$ and $y'(2) = 7$, then: $z'(1) =$

A. 9

B. 14

C. 17

D. 19\

Answer: D

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474. Let $u(x)$ and $v(x)$ be differentiable functions such that $u(x):v(x) = 7.$

If : $u'(x):v'(x) = p$ and $y'(2) = 7$, then: $(p+q):(p-q) =$

A. 1

B. 0

C. 7

D. -7

Answer: A

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475. If :

$$y = \sin x\left[\frac{1}{\cos x \cdot \cos 2x} + \frac{1}{\cos 2x \cdot \cos 3x} + \frac{1}{\cos 3x \cdot \cos 4x}\right], \text{ then: } \frac{dy}{dx} \text{ at } x = \frac{\pi}{4}$$

is

A. 0

B. 1

C. 2

D. 4

Answer: C

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476. If : $y = \frac{1}{x}$, then: $\frac{dy}{\sqrt{1+y^4}} + \frac{dx}{\sqrt{1+x^4}} =$

A. 0

B. 1

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

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

Answer: A

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477. If : $y = \frac{7k}{1+x}$, then: $7kx \cdot \frac{dy}{dx} =$

A. $x(y - 7k)$

B. $k(y - x)$

C. $y(y - 7k)$

D. $7k(x - y)$

Answer: C

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478. If : $ex = e^{x/y}$ and $\frac{dy}{dx} = \frac{3}{16}$ at $x = a$, then: $a =$

A. 2

B. 3

C. e^2

D. e^3

Answer: D

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479. If : $y = \cos^{-1}\left(8x^4 - 8x^2 + 1\right)$, then: $\frac{dy}{dx} =$

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

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

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

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

Answer: B

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480. If : $\frac{dx}{dy} = u$ and $\frac{d^2x}{dy^2} = v$, then: $\frac{d^2y}{dx^2} =$

A. $-\frac{v}{u^2}$

B. $\frac{v}{u^2}$

C. $-\frac{v}{u^3}$

D. $\frac{v}{u^3}$

Answer: C

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481. Let f(x) = $\begin{vmatrix} x^3 & \sin x & \cos x \\ 6 & -1 & 0 \\ p & p^2 & p^3 \end{vmatrix}$ where p is a constant. Then $\frac{d^3}{dx^3}\{f(x)\}$ at x=0 is

A. p

B. $p + p^2$

C. $p + p^3$

D. independent of p

Answer: D

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482. Let $f:(1, 1)\vec{R}$ be a differentiable function with $f(0) = 1 and f'(0) = 1$. Let $g(x) = [f(2f(x) + 2)]^2$. Then $g'(0) =$ (1) 4 (2) 0 (3) 2 (4) 4

A. -4

B. 0

C. -2

D. 4

Answer: A

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483. If : $f\left(\frac{x^2+1}{x}\right)=\frac{x^4+1}{x^2}$, where $x\neq 0$, then: $f'(3)=$

A. 6

B. 0

C. 3

D. 9

Answer: A

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484. If $y = \tan^{-1}\sqrt{x^2+1} + \cot^{-1}\sqrt{x^2+1}$ then $\dfrac{dy}{dx} =$

A. 0

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

C. 1

D. not defined

Answer: A

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485. If $y = e^{\log_e x}$, then $\dfrac{dy}{dx} =$

A. 0

B. x

C. e

D. 1

Answer: D

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

A. 0

B. 1

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

D. a+b

Answer: B

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487. If $y = \log\left(\frac{e^x}{x^2}\right)$, then $\frac{dy}{dx} =$

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

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

C. $e^x - x^2$

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

Answer: A

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488. If $xy = \tan^{-1}xy + \cot^{-1}xy$ then $y_1 =$

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

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

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

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

Answer: B

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489. Find $\frac{dy}{dx}$, if $x = \cos\theta - \cos 2\theta$, $y = \sin\theta - \sin 2\theta$

A. $-\cot\left(\frac{3\theta}{2}\right)$

B. $\tan\left(\frac{3\theta}{2}\right)$

C. $\tan\theta$

D. $\cot\theta$

Answer: B

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490. The derivative of $\cos^3 x$ w.r.t. $\sin^3 x$ is

A. $\tan x$

B. $\cot x$

C. $-\tan x$

D. $-\cot x$

Answer: D

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491. If $e^x + e^y = e^{x+y}$ then $y_1 =$

A. e^{x-y}

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

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

D. $-e^{y-x}$

Answer: D

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492. If $x^2y^5 = (x+y)^7$, then $\dfrac{d^2y}{dx^2}$ is equal to

A. y/x^2

B. y/x

C. 1

D. 0

Answer: D

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493. If $x\sec\theta, y = \tan\theta$, then the value of $\frac{d^2y}{dx^2}$ at $\theta = \frac{\pi}{4}$ is

A. 0

B. 1

C. - 1

D. 2

Answer: C

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494. If $x = f(t)$ and $y = g(t)$, then write the value of $\frac{d^2y}{dx^2}$.

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

D. $\frac{g'(t)f''(t) - g''(t)f'(t)}{\{f'(t)\}^3}$

Answer: A

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495. Differentiate $(\log x)^x$ with respect to $\log x$.

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

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

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

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

Answer: C

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496. If g is the inverse of f and f'(x) = $\frac{1}{1 + x^2}$, then g'(x) is equal to

A. $1 + [g(x)]^2$

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

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

D. $1 + [f(x)]^2$

Answer: A

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

A. 1

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

C. -2

D. -1

Answer: A

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498. If $f(x) = \tan^{-1} x$, then the derivative of $f(\tan x) w.r.t. f(\cot x)$ is

A. -1

B. 1

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

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

Answer: A

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499. If $\log(x+y) = \log(xy) + a$, show that $\frac{dy}{dx} = -\frac{y^2}{x^2}$

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

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

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

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

Answer: D

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500. If $x = \theta - \sin\theta$ and $y = 1 - \cos\theta$, then $\frac{d^2y}{dx^2} =$

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

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

C. $\tan\theta$

D. $\cot\theta$

Answer: A

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501. If let $y = \cos^{-1}\left(\dfrac{1-e^{2x}}{1+e^{2x}}\right)$ then $\dfrac{dy}{dx} =$

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

B. $\dfrac{e^x}{1+e^{2x}}$

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

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

Answer: A

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MULTIPLE CHOICE QUESTIONS (TEST YOUR GRASP - I : CHAPTER 11)

1. If $f(1) = 1, f'(1) = 2,$ then write the value of $(\lim)_{x \to 1} \frac{\sqrt{f(x)} - 1}{\sqrt{x} - 1}$

A. 1

B. 2

C. 3

D. 4

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2. If $G(x) = -\sqrt{25 - x^2}$, find the value of $\lim (x \to 1) \frac{G(x) - G(1)}{x - 1}$

A. $-\frac{3}{\sqrt{24}}$

B. $-\frac{1}{\sqrt{24}}$

C. $\frac{1}{\sqrt{24}}$

D. $-\sqrt{24}$

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3. $\frac{d^2}{dx^2}\left[\lim_{h \to 0}\frac{(x+h)^4 - x^4}{h}\right] =$

A. $12x^2$

B. 24x

C. 24

D. $4x^2$

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4. If

$y = u/v$, where u, v, are differentiable functions of x and $v \neq 0$, then: $u\dfrac{dv}{dx} + v^2$

A. $\dfrac{du}{dv}$

B. $v\dfrac{du}{dx}$

C. $\dfrac{du}{dx} \cdot \dfrac{dv}{dx}$

D. $\dfrac{dv}{du}$

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5. If $y = \dfrac{e^3 - e^{2x}}{e^3 + e^{2x}}$, then: $\dfrac{dy}{dx} =$

A. $2e^{5x}$

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

C. $\dfrac{e^{5x}}{e^3 + e^{2x}}$

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

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6. If $f(x) = \left(\sqrt{x} + \frac{1}{\sqrt{x}}\right)^2$, then: $f'(2) =$

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

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

C. 0

D. $2\sqrt{2}$

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7. If $xy = 1$, then: $y^2 + \frac{dy}{dx} =$

A. 1

B. 0

C. -1

D. 2

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8. If $\log\left(\frac{x}{y}\right) = x + y, \text{ then: } \frac{dy}{dx} =$

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

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

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

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

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9. If $x = t - \frac{1}{t}$, and $y = t + \frac{1}{t}$, then the value of $\frac{dy}{dx}$ at $t = 2$ is

A. $\frac{3}{5}$

B. $-\frac{3}{5}$

C. $\frac{5}{3}$

D. $\frac{5}{4}$

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10. If $x = \frac{1 - t^2}{1 + t^2}$ and $y = \frac{2t}{1 + t^2}$, then: $\frac{dy}{dx}\Big|_{t=1}$ is

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

B. 1

C. 0

D. 2

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11. if $y=\sqrt{x^2+a^2}$, then show that $y\frac{dy}{dx}=x$

A. $-x$

B. x

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

D. 1

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

A. $\sqrt{y^2+4}$

B. $\sqrt{y^2-4}$

C. $\sqrt{4-y^2}$

D. $4y^2$

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

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

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

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

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

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

A. 0

B. -1

C. 1

D. $\dfrac{2t^2}{(1+t)^4}$

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15. If $y = \log\left[(x-1)^{1/2} - (x+1)^{1/2}\right]$, then: $\dfrac{dy}{dx} =$

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

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

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

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

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

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

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

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

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

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17. If $y = a + bx^2$, then:

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

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

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

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

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

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

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

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

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

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19. If $y = \cos\left(3\cos^{-1}x\right)$, then: $\frac{d^2y}{dx^2} =$

A. $3x - 4x^3$

B. $-24x$

C. -24

D. 24x

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MULTIPLE CHOICE QUESTIONS (TEST YOUR GRASP - II : CHAPTER 11)

1. If $x = t \cdot \log t$ and $y = t^t$, then: $\frac{dy}{dx} =$

A. xe^y

B. t^t

C. e^{-x}

D. $\log t$

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2. If $2x = y^{1/n}$, then: $x^2\left(y_1\right)^2 =$

A. n^2y^2

B. ny^2

C. n^2y

D. ny

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3. If $y = x^2 + 1$ and $u = \sqrt{1 + x^2}$, then: $\frac{dy}{dx} =$

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

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

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

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

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4. If $y = \sqrt{\cos 2x}$, then: $yy_2 + 2y^2 =$

A. 0

B. $-y_1^2$

C. y_1^2

D. yy_1

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5. If $x = \frac{t+1}{t}, y = \frac{t-1}{t}$, then: $\frac{dy}{dx} =$

A. 1

B. 0

C. 2

D. -1

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

A. $(1, 2)$

B. $(2, 1)$

C. $(2, -1)$

D. $(1, -2)$

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

A. -2

B. -1

C. 1

D. 2

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8. If $y = \left(x^{\frac{1}{3}} - x^{-\frac{1}{3}}\right)$ then $\frac{dy}{dx}$ is

A. $\frac{2x^{4/3}}{\left(x^{2/3} - x^{-1/3}\right)^2}$

B. 1

C. -1

D. 0

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9. If $y = \frac{e^{4\log x} - e^{3\log x}}{e^{2\log x} - e^{\log x}}$, then: $\frac{dy}{dx} =$

A. x

B. 2x

C. 3x

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

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10. If $y = \cos^2\left[\tan^{-1}\sqrt{\frac{1-x}{1+x}}\right)\Big]$ then $\frac{dy}{dx} =$

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

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

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

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

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11. $\frac{d}{dx}\left[\sin^{-1}\left(x - \frac{4x^3}{27}\right)\right] =$ 4x327dx

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

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

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

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

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12. $\frac{d}{dx}\left(\sec^2 x \cdot \csc^2 x\right) =$

A. $-4\sec x \cdot \tan x \cdot \csc x \cdot \cot x$

B. $-4\sec x \cdot \csc x$

C. $2\sec x \cdot \tan x - 2\csc x \cdot \cot x$

D. $2\sec^2 x \cdot \tan x - 2\csc^2 x \cdot \cot x$

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13. If $y = \log\left(\frac{1}{1-x}\right)$, then: $\frac{dy}{dx} - 1 =$

A. xe^{-y}

B. xe^{y}

C. $-x$

D. x

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14. If $y = 4^{\log 2(\sin x)} + 9^{\log 3(\cos x)}$, then $\left(\log 2(\log 3)y_1 =\right.$

A. 0

B. $6\sec x \cdot \tan x$

C. 1

D. $\sin 2x$

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

A. 4y

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

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

D. $\frac{1}{4y}$

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16. If $y = \left(1 + x^{\frac{1}{4}}\right)\left(1 + x^{\frac{1}{2}}\right)\left(1 - x^{\frac{1}{4}}\right)$, then find $\frac{dy}{dx}\cdot$

A. 1

B. -1

C. x

D. $\sqrt{x}$

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17. If $x^2 = 1 + \cos y, \quad \text{then: } \frac{dy}{dx} =$

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

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

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

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

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18. Defferential coefficient of $x^x w.r.t.\, x \cdot \log x$ is

A. $1 + \log x$

B. $x^2 \cdot \log x$

C. x^x

D. $\log x$

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19. If $x = \sqrt{y + \sqrt{y + \sqrt{y + \ldots\text{to}\infty}}}$, then: $\dfrac{dy}{dx} =$

A. $\frac{1}{2x - 1} \cdot \frac{dx}{dy}$

B. 2x-1

C. $\frac{1}{2\sqrt{y}} \frac{dx}{dy}$

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

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20. If $3x^2 + 4xy - 5y^2 = 0, \text{ then: } \frac{dy}{dx} =$

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

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

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

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

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21. If $x^2y^3 = (x+y)^5$, then $\frac{d^2y}{dx^2}$ is

A. 0

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

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

D. 1

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

A. $\tan(x+y)$

B. $\log[\tan(x+y)]$

C. -1

D. 1

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23. If an even function f is differentiable at x=0, then f '(0)=`

A. -1

B. 0

C. 1

D. 2

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24. If $y = t^2 - t + 1$, then: $\frac{dy}{dx} =$

A. 2t-1

B. not defined

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

D. 2x-1

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