Derivative Gate Exam Practice (version 0)

Calculus **Gate Exam** for Derivatives (version 0) Remember, in order to pass this test,
ALL TEN PROBLEMS MUST BE DONE ENTIRELY CORRECTLY

For each of the following, find y'

1. $y = \dfrac{\ln[\csc^2(x)]}{\sqrt{3}}$

$= \dfrac{1}{\sqrt{3}} \ln[\csc^2(x)]$

$= \dfrac{2}{\sqrt{3}} \ln[\csc(x)]$

$y' = \dfrac{2}{\sqrt{3}} \cdot \dfrac{-\csc x \cot x}{\csc(x)}$

$= \dfrac{-2\cot x}{\sqrt{3}}$

2. $y = \sin^{-1}(\sqrt{x})$ $\quad \frac{d}{dx} x^{\frac{1}{2}} = \frac{1}{2} x^{-\frac{1}{2}}$

$y' = \dfrac{\frac{1}{2} x^{-\frac{1}{2}}}{\sqrt{1-x}}$

$y' = \dfrac{\frac{1}{2\sqrt{x}}}{\sqrt{1-x}}$

3. $y = \dfrac{\cos x}{e^{3x} + x^4} + 11x^3$

$y' = \dfrac{-\sin x (e^{3x} + x^4) - \cos x (3e^{3x} + 4x^3)}{(e^{3x} + x^4)^2} + 33x^2$

4. $y = x^3 \cot x - \tan(3x)$ (Chain)

$y' = 3x^2 \cot x + x^3(-\csc^2 x) - 3\sec^2(3x)$

5. $x^2 y^3 + x \cdot \sin y = y^4$

$2xy^3 + x^2 3y^2 y' + \sin y + x y' \cos y = 4y^3 y'$

$3xy y' + (x\cos y) y' - 4y^3 y' = -2xy^3 - \sin y$

$(3xy + x\cos y - 4y^3) y' = -2xy^3 - \sin y$

$y' = \dfrac{-2xy^3 - \sin y}{3xy + x\cos y - 4y^3}$

6. $y = \dfrac{x^4}{8^x}$

$y' = \dfrac{4x^3 8^x - x^4 (\ln 8) 8^x}{(8^x)^2}$

7. $y = 4\ln\left(\dfrac{1}{x^9}\right) - \dfrac{1}{x^2}$

$y = 4\ln(x^{-9}) - x^{-2}$

$= -36 \ln x - x^{-2}$

$y' = \dfrac{-36}{x} + 2x^{-3} = \dfrac{-36}{x} + \dfrac{2}{x^3}$

8. $y = \tan^{-1}\left(\dfrac{1}{x^5}\right) - \log_7(x^4 + 3x^2 - 11)$

$y = \tan^{-1}(x^{-5}) - \log_7(x^4 + 3x^2 - 11)$

$y' = \dfrac{-5/x^6}{1 + \frac{1}{x^{10}}} - \dfrac{4x^3 + 6x}{\ln 7 (x^4 + 3x^2 - 11)}$

9. $y = \dfrac{8x-1}{6x+1}$

$y' = \dfrac{8(6x+1) - (8x-1)6}{(6x+1)^2}$

10. $y = 2xe^{\sec x} - \dfrac{32}{x} = 2xe^{\sec x} - 32x^{-1}$

$y' = 2e^{\sec x} + 2x(\sec x \tan x)e^{\sec x} + 32x^{-2}$

$y = 2e^{\sec x} + 2x(\sec x \tan x)e^{\sec x} + \dfrac{32}{x^2}$

bonus:

$y = e^{\frac{\sqrt{\pi^{15}}}{\ln(6^{35e^{\pi}})}} + e^x$

$y' = 0 + e^x$