National Institute of Open Schooling (NIOS)
Senior Secondary Course
Lesson – 28: Differentiation of Exponential & Logarithmic Functions
Worksheet -28

1.   Find the derivative of following exponential functions

(A) e^{7x}
(B) $e^x + 3^{\sin x}$

2.   If $e^x + e^y = e^{x+y}$, then prove that $\dfrac{dy}{dx} = -e^{y-x}$

3.   If $x = e^{\frac{x}{y}}$, then prove that $\dfrac{dy}{dx} = \dfrac{x-y}{x \log x}$

4.   If $(\cos x)^y = (\sin y)^x$, the find $\dfrac{dy}{dx}$.

5.   If $y = a^x + e^x + x^x + x^a$, then find $\dfrac{dy}{dx}$ at $x = a$

6.   If $f(x) = \log\left\{\dfrac{u(x)}{v(x)}\right\}, u(1) = v(1)$ and $u^1(1) = v^1(1) = 2$, then find $f^1(1)$

7.   If $y = ae^{2x} + be^{-x}$, then show that $\dfrac{d^2 y}{dx^2} - \dfrac{dy}{dx} - 2y = 0$

8.   If $y = \log(1 + \cos x)$ then prove that $\dfrac{d^3 y}{dx^3} + \dfrac{d^2 y}{dx^2} \cdot \dfrac{dy}{dx} = 0$ then find $f^1(1)$

9.

If $y = x^2$, then $\dfrac{d^2y}{dx^2} - \dfrac{1}{y}\left(\dfrac{dy}{dx}\right)^2 - \dfrac{y}{x} = 0$

10.

If $e^y(x+1) = 1$, then show that $\dfrac{d^2y}{dx^2} = \left(\dfrac{dy}{dx}\right)^2$