

1. If  $\phi(x) = \log_8 \log_3 x$ , then  $\phi'(e)$  is equal to
  - (1)  $e \log 8$
  - (2)  $-e \log 8$
  - (3)  $\frac{1}{e \log 8}$
  - (4) None of these
2. If  $y = \log_e x^3 + 3 \sin^{-1} x + kx^2$  and  $y'\left(\frac{1}{2}\right) = 2\sqrt{3}$  then  $k =$ 
  - (1) 6
  - (2) -6
  - (3)  $2\sqrt{3}$
  - (4) -2
3. If  $x = \sec t + \tan t$  and  $y = \sec t - \tan t$ , where  $t$  is a parameter, then the value of  $\frac{dy}{dx}$  when  $x = \frac{1}{\sqrt{3}}$  is
  - (1) 0
  - (2) -3
  - (3)  $\sqrt{3}$
  - (4)  $\frac{1}{\sqrt{3}}$
4. If  $f(x) = 2^x$  and  $g(x) = 3^x$ , then  $\frac{f'(0) - g'(0)}{1 + f'(0)g'(0)} =$ 
  - (1)  $\frac{\log 2}{1 + \log 6}$
  - (2)  $\frac{\log 6}{1 + \log 6}$
  - (3)  $\frac{\log 2}{1 + \log 2 \log 3}$
  - (4) 0
5. If  $y = \tan^{-1} x$  and  $z = \cot^{-1} x$ , then  $\frac{dy}{dz}$  is equal to
  - (1)  $\frac{\pi}{2}$
  - (2) 1
  - (3) -1
  - (4) None of these
6. If  $f'(1) = 2$ ,  $g'(\sqrt{2}) = 4$  then the derivative of  $f(\tan x)$  with respect to  $g(\sec x)$  at  $x = \pi/4$  is
  - (1) 1
  - (2)  $\sqrt{2}$
  - (3)  $\frac{\sqrt{2}}{2}$
  - (4) 2
7. If  $y = x^{\tan x} \cdot \tan^{-1} x$ , then find the value of  $\frac{dy}{dx}$  at  $x = 1$ .
  - (1) 1
  - (2)  $\frac{\pi}{2}$
  - (3)  $-\frac{1}{2}$
  - (4)  $\frac{1}{2}$
8. If  $y = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots \infty$ , then  $\frac{dy}{dx} =$ 
  - (1)  $y$
  - (2)  $y - 1$
  - (3)  $y + 1$
  - (4) None of these
9. Let,  $f(x) = 2^{2x-1}$  and  $\phi(x) = -2^x + 2x \log 2$ . If  $f'(x) > \phi'(x)$ , then
  - (1)  $0 < x < 1$
  - (2)  $0 \leq x < 1$
  - (3)  $x > 0$
  - (4)  $x \geq 0$
10. If  $(\cos x)^y = (\sin y)^x$ , find  $\frac{dy}{dx}$ .
  - (1)  $\frac{\log \cos y + y \tan x}{\log \cos x - x \cot y}$
  - (2)  $\frac{\log \sin y + y \tan x}{\log \cos x - x \cot y}$
  - (3)  $\frac{\log \sin y - y \tan x}{\log \cos x + x \cot y}$
  - (4)  $\frac{\log \sin y + y \tan x}{\log \sin x - x \cot y}$