

King Fahd University of Petroleum and Minerals  
 Department of Mathematical Sciences  
 Semester(Term 041) MATH 101 (Quiz-IV)

Name: \_\_\_\_\_

*Solution*

ID# \_\_\_\_\_

1. Find the value of  $\sin^{-1}\left(\cot\frac{\pi}{4}\right)$ .

$$\sin^{-1}\left(\cot\frac{\pi}{4}\right) = \sin^{-1}(1) = \frac{\pi}{2}$$

2. Find  $y'$  for each of the following:

(a)  $y = \ln(3x\sqrt{3-x^2})$ .

$$y = \ln 3x + \ln \sqrt{3-x^2} = \ln 3x + \frac{1}{2} \ln(3-x^2)$$

$$\dot{y} = \frac{1}{x} - \frac{2x}{2(3-x^2)} = \frac{1}{x} - \frac{x}{3-x^2} = \frac{3-4x^2}{x(3-x^2)}$$

(b)  $y = e^{\sec 7x}$ .

$$\dot{y} = e^{\sec 7x} \cdot \sec 7x \tan 7x \cdot 7 = 7 \sec 7x \tan 7x e^{\sec 7x}$$

(c)  $y = e^{2x} \tan^{-1} 3x$ .

$$\dot{y} = e^{2x} \frac{1}{1+9x^2} \cdot 3 + 2e^{2x} \tan^{-1} 3x = \frac{3e^{2x}}{1+9x^2} + 2e^{2x} \tan^{-1} 3x$$

(d)  $y = (\tan x)^x$ .

$$\Rightarrow \ln|y| = \ln|(\tan x)^x| = x \ln|\tan x|$$

$$\frac{\dot{y}}{y} = x \frac{\sec^2 x}{\tan x} + \ln|\tan x|$$

$$\dot{y} = \left[ \frac{x \sec^2 x}{\tan x} + \ln|\tan x| \right] (\tan x)^x$$