Name_____

Chapter 3 Practice Test

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Solve the problem.

1) The function $V = 3\pi r^2$ describes the volume of a right circular cylinder of height 3 feet and radius r feet. Find the (instantaneous)rate of change of the volume with respect to the radius when r = 5. Leave answer in terms of π. 1) _____

Find dy/dx.

2) $s = t^6 \tan t$ 2) _____

The equation gives the position s = f(t) of a body moving on a coordinate line (s in meters, t in seconds).

3) $s = -6 + 3\cos t$

Find the body's jerk at time $t = \pi/3$ sec.

$v = -3\sin t$

$a = -3\cos t$

$j = 3\sin\frac{\pi}{3}$

$= 3\left(\frac{\sqrt{3}}{2}\right)$

$= \frac{3\sqrt{3}}{2}$

Find the indicated derivative.

4) Find y'' if $y = -8\cos x$.

$y' = 8\sin x$

$y'' = 8\cos x$

Find dy/dx.

5) $y = \sqrt{6 + \sin 2x}$

$y = (6+\sin 2x)^{1/2}$

$f = u^{1/2}$

$f' = \frac{1}{2}u^{-1/2}$

$u = 6 + \sin 2x$

$u' = \cos(2x)\cdot 2$

$\frac{dy}{dx} = \frac{1}{2}(6+\sin 2x)^{-1/2}(\cos(2x)\cdot 2)$

$f = \sin u \quad u = 2x$

$f' = \cos u \quad u' = 2$

3)

$$\frac{\cos(2x)}{\sqrt{6+\sin 2x}}$$

4)

Find the value of $(f \circ g)'$ at the given value of x.

6) $f(u) = \frac{u-1}{u+1}$, $u = g(x) = \sqrt{x}$, $x = 64$ 6) _____

$u = x^{1/2}$ $u' = \frac{1}{2}x^{-1/2}$

$g(64) = 8$

7) $f(u) = \frac{1}{\cos^2 u} - u$, $u = g(x) = \pi x$, $x = 10$ 7) _____

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(6) $f = u-1$ $g = u+1$

$f' = 1$ $g' = 1$

$\left(\frac{(u+1)(1) - (u-1)(1)}{(u+1)^2}\right)\left(\frac{1}{2}x^{-\frac{1}{2}}\right)$

$\frac{1}{2}\sqrt{64} = \frac{1}{2}\cdot 8$

$\left(\frac{f'(u)}{\frac{(8+1)-(8-1)}{(8+1)^2}}\right)\left(\frac{1}{16}\right)$ $u' = \left(\frac{2}{81}\right)\left(\frac{1}{16}\right)$

$= \frac{1}{648}$

Find dy/dx by implicit differentiation. If applicable, express the result in terms of x and y.

8) $\cos xy + x^3 = y^3$ 8) _____

Find dy/dx.

9) $y = \sqrt[7]{x^{-2}}$ 9) _____

$\frac{d}{dx}\cos xy + \frac{d}{dx}x^3 = \frac{d}{dx}y^3$

$f = \cos u \quad u = xy$

$f' = -\sin u \quad u' = y + xy'$

$f = x \quad g = y$

$f' = 1 \quad g' = \frac{dy}{dx} = y'$

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

$-\frac{2}{7} - 1$

$-\frac{2}{7} - \frac{7}{7}$

$-\frac{2}{7}$

(A) $\frac{d}{dx}\left[x^{-2/7}\right] = \frac{-2}{7}x^{-9/7}$