Math 3A HW #6

Answers must be submitted via Moodle before 10AM on Wednesday, March 29th, 2017.

Good luck!

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Use implicit differentiation to find dy/dx.

1) $2xy - y^2 = 1$ 1) _____

A) $\frac{y}{y-x}$ B) $\frac{x}{y-x}$ C) $\frac{y}{x-y}$ D) $\frac{x}{x-y}$

2) $x^3 = \cot y$ 2) _____

A) $-\frac{3x^2}{\csc y \cot y}$ B) $\frac{\csc^2 y}{3x^2}$ C) $\frac{3x^2}{\csc^2 y}$ D) $-\frac{3x^2}{\csc^2 y}$

3) $\cos xy + x^4 = y^4$ 3) _____

A) $\frac{4x^3 - y \sin xy}{4y^3 + x \sin xy}$ B) $\frac{4x^3 - x \sin xy}{4y^3}$

C) $\frac{4x^3 + x \sin xy}{4y^3}$ D) $\frac{4x^3 + y \sin xy}{4y^3 - x \sin xy}$

4) $y \cos\left(\frac{1}{y}\right) = 10x + 10y$ 4) _____

A) $\frac{10}{\sin\left(\frac{1}{y}\right) + y \cos\left(\frac{1}{y}\right) - 10}$ B) $\frac{10 - y \sin\left(\frac{1}{y}\right)}{\cos\left(\frac{1}{y}\right) - 10}$

C) $\frac{10y^2}{\sin\left(\frac{1}{y}\right) - 10y^2}$ D) $\frac{10y}{\sin\left(\frac{1}{y}\right) + y \cos\left(\frac{1}{y}\right) - 10y}$

5) $e^{3x} = \sin(x + 3y)$ 5) _____

A) $\frac{dy}{dx} = \frac{9e^x}{\sin(x+3y)}$ B) $\frac{dy}{dx} = -\frac{3e^x}{3\sin(x+3y)}$

C) $\frac{dy}{dx} = \frac{-3e^x}{\sin(x+3y)}$ D) $\frac{dy}{dx} = \frac{3e^x}{3\sin(x+3y)}$

6) $x = \sec(2y)$ 6) _____

A) $\frac{1}{2}\cos(2y)\cot(2y)$ B) $2\sec(2y)\tan(2y)$

C) $\frac{1}{2}\sec(2y)\tan(2y)$ D) $\cos(2y)\cot(2y)$

At the given point, find the slope of the curve or the line that is tangent to the curve, as requested.

7) $y^4 + x^3 = y^2 + 11x$, slope at (0, 1) 7) _____

A) $\frac{11}{6}$ B) $\frac{11}{2}$ C) $-\frac{7}{2}$ D) $\frac{11}{4}$

8) $x^6y^6 = 64$, slope at (2, 1) 8) _____

A) $-\frac{1}{4}$ B) -32 C) 2 D) $-\frac{1}{2}$

9) $5x^2y - \pi\cos y = 6\pi$, slope at $(1, \pi)$ 9) _____

A) 0 B) $-\frac{\pi}{2}$ C) -2π D) π

Find the derivative of y with respect to x, t, or θ, as appropriate.

10) $y = \ln(\cos(\ln\theta))$ 10) _____

A) $\frac{\tan(\ln\theta)}{\theta}$ B) $-\tan(\ln\theta)$ C) $-\frac{\tan(\ln\theta)}{\theta}$ D) $\tan(\ln\theta)$

11) $y = \ln\frac{1-x}{(x+4)^5}$ 11) _____

A) $\ln\frac{6x-9}{(x+4)^6}$ B) $\frac{4x-9}{(x+4)(1-x)}$ C) $\frac{4x-9}{(x+4)^6}$ D) $\frac{(x+4)^5}{1-x}$

12) $y = x^4\ln x - \frac{1}{3}x^3$ 12) _____

A) $4x^3 - x^2$ B) $x^4\ln x - x^2 + 4x^3$

C) $5x^3 - x^2$ D) $x^3 - x^2 + 4x^3\ln x$

Find the derivative of y with respect to x.

13) $y = \sec^{-1}\left(\frac{2x+3}{7}\right)$ 13) _____

A) $\frac{14}{\sqrt{(2x+3)^2 - 3}}$ B) $\frac{-14}{1 + (2x+3)^2}$

C) $\frac{14}{(2x+3)\sqrt{(2x+3)^2 - 49}}$ D) $\frac{-14}{(2x+3)\sqrt{(2x+3)^2 - 1}}$

14) $y = 5x^4 \sin^{-1} x$ 14) _____

A) $\dfrac{5x^4}{1 + x^2} + 20x^3 \sin^{-1} x$

B) $\dfrac{1}{\sqrt{1 - x^2}} + 20x^3$

C) $\dfrac{5x^4}{\sqrt{1 - x^2}} + 20x^3 \sin^{-1} x$

D) $\dfrac{5x^4}{\sqrt{1 - x^2}}$

Solve the problem. Round your answer, if appropriate.

15) A piece of land is shaped like a right triangle. Two people start at the right angle of the triangle at the same time, and walk at the same speed along different legs of the triangle. If the area formed by the positions of the two people and their starting point (the right angle) is changing at $2\ m^2/s$, then how fast are the people moving when they are 4 m from the right angle? (Round your answer to two decimal places.) 15) _____

A) 0.50 m/s B) 0.25 m/s C) 1.00 m/s D) 8.00 m/s

16) Water is being drained from a container which has the shape of an inverted right circular cone. The container has a radius of 3.00 inches at the top and a height of 6.00 inches. At the instant when the water in the container is 3.00 inches deep, the surface level is falling at a rate of 2 in./sec. Find the rate at which water is being drained from the container. 16) _____

A) 23.6 $in.^3/s$ B) 13.5 $in.^3/s$ C) 22.0 $in.^3 s$ D) 14.1 $in.^3/s$

17) A ladder is slipping down a vertical wall. If the ladder is 20 ft long and the top of it is slipping at the constant rate of 4 ft/s, how fast is the bottom of the ladder moving along the ground when the bottom is 16 ft from the wall? 17) _____

A) 0.25 ft/s B) 5.0 ft/s C) 0.8 ft/s D) 3.0 ft/s

Solve the problem.

18) A wheel with radius 3 m rolls at 17 rad/s. How fast is a point on the rim of the wheel rising when the point is $\pi/3$ radians above the horizontal (and rising)? (Round your answer to one decimal place.) 18) _____

A) 51.0 m/s B) 12.8 m/s C) 102.0 m/s D) 25.5 m/s

Solve the problem. Round your answer, if appropriate.

19) Boyle's law states that if the temperature of a gas remains constant, then PV = c, where P = pressure, V = volume, and c is a constant. Given a quantity of gas at constant temperature, if V is decreasing at a rate of 14 $in.^3$/sec, at what rate is P increasing when P = 60 $lb/in.^2$ and V = 20 $in.^3$? (Do not round your answer.) 19) _____

A) $\dfrac{600}{7}$ $lb/in.^2$ per sec

B) 42 $lb/in.^2$ per sec

C) 9 $lb/in.^2$ per sec

D) $\dfrac{14}{3}$ $lb/in.^2$ per sec