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

Find the derivative.

1) $s = t^7 \tan t - \sqrt{t}$

Solve the problem.

2) Find the equation of tangent line to $y = \cos x$ at $x = \frac{\pi}{2}$.

Use implicit differentiation to find dy/dx .

3) $\cos xy + x^7 = y^7$

Find the derivative of the function.

4) $h(\theta) = \sqrt{6 + \sin(8\theta)}$

5) $h(x) = \left(\frac{\cos x}{1 + \sin x} \right)^6$

Find dy/dx by implicit differentiation.

6) $xy + x + y = x^2y^2$

Find $\frac{dy}{dx}$.

7) $\ln 6xy = e^{x+y}$

8) $e^{xy} = \sin x$

Solve the problem.

9) A man 6 ft tall walks at a rate of 5 ft/s away from a lamppost that is 23 ft high. At what rate is the length of his shadow changing when he is 60 ft away from the lamppost?

10) A ball dropped from the top of a building has a height of $s = 144 - 16t^2$ meters after t seconds. How long does it take the ball to reach the ground? What is the ball's velocity at the moment of impact?

Solve the problem. Round your answer, if appropriate.

11) One airplane is approaching an airport from the north at 172 km/hr. A second airplane approaches from the east at 282 km/hr. Find the rate at which the distance between the planes changes when the southbound plane is 32 km away from the airport and the westbound plane is 16 km from the airport. Round to the nearest kilometer per hour.

Find the derivative of the function.

12) $q = \sqrt{12r - r^3}$

13) $y = 5 \sec^6 x$

$$14) h(x) = \left(\frac{\cos x}{1 + \sin x} \right)^3$$

$$15) y = \cos^5(\pi t - 15)$$

Use logarithmic differentiation to find the derivative of y with respect to the independent variable.

$$16) y = x^{10} \sin x$$

$$17) y = 8x^{x^2}$$

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

$$18) y = 8e^\theta(\sin \theta - \cos \theta)$$

$$19) y = \sin e^{-\theta^5}$$

Find the derivative of y with respect to x .

$$20) y = -\cos^{-1} \left(\frac{1}{x^2} \right)$$

$$21) y = \tan^{-1} \sqrt{11x}$$

$$22) y = \tan^{-1} (\ln 4x)$$

Solve the problem.

23) A certain radioactive isotope decays at a rate of 2% per 100 years. If t represents time in years and y represents the amount of the isotope left then the equation for the situation is $y = y_0 e^{-0.0002t}$. In how many years will there be 93% of the isotope left?

24) Find the half-life of the radioactive element radium, assuming that its decay constant is $k = 4.332 \times 10^{-4}$, with time measured in years.

25) A loaf of bread is removed from an oven at 350°F and cooled in a room whose temperature is 70°F . If the bread cools to 210°F in 20 minutes, how much longer will it take the bread to cool to 185°F .

Answer Key

Testname: REVIEWTEST1ADDITIONAL3211

$$1) \frac{ds}{dt} = t^7 \sec^2 t + 7t^6 \tan t - \frac{1}{2\sqrt{t}}$$

$$2) y = -x + \frac{\pi}{2}$$

$$3) \frac{7x^6 - y \sin xy}{7y^6 + x \sin xy}$$

$$4) h'(\theta) = \frac{4 \cos(8\theta)}{\sqrt{6 + \sin(8\theta)}}$$

$$5) h'(x) = \frac{-6 \cos^5 x}{(1 + \sin x)^6}$$

$$6) \frac{2xy^2 - y - 1}{-2x^2y + x + 1}$$

$$7) \frac{xye^{x+y} - y}{x - xye^{x+y}}$$

$$8) \frac{\cos x - ye^{xy}}{xe^{xy}}$$

$$9) \frac{30}{17} \text{ ft/s}$$

10) 3 sec, -96 m/sec

11) -280 km/hr

$$12) \frac{dq}{dr} = \frac{12 - 3r^2}{2\sqrt{12r - r^3}}$$

$$13) \frac{dy}{dx} = 30 \tan x \sec^6 x$$

$$14) h'(x) = \frac{-3 \cos^2 x}{(1 + \sin x)^3}$$

$$15) \frac{dy}{dt} = -5\pi \cos^4(\pi t - 15) \sin(\pi t - 15)$$

$$16) 10x^{10} \sin x \left(\cos x \ln x + \frac{\sin x}{x} \right)$$

$$17) 8x^2(2x \ln 8x + x)$$

$$18) 16e^\theta \sin \theta$$

$$19) (-5\theta^4 e^{-\theta^5}) \cos e^{-\theta^5}$$

$$20) \frac{-2}{x\sqrt{x^4 - 1}}$$

$$21) \frac{11}{2(1 + 11x)\sqrt{11x}}$$

$$22) \frac{1}{x(1 + \ln^2 4x)}$$

23) 363 years

24) 1600 years

Answer Key

Testname: REVIEWTEST1ADDITIONAL3211

25) 6 min