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

**Solve the problem.**

1) Suppose that the dollar cost of producing x radios is $c(x) = 400 + 20x - 0.2x^2$. Find the marginal cost when 40 radios are produced.

1) _____

2) Assume that a watermelon dropped from a tall building falls $y = 16t^2$ ft in t sec.  Find the watermelon's average speed during the first 4 sec of fall and the speed at the instant t = 4 sec.

2) _____

3) Does the graph of the function $y = \tan x - x$ have any horizontal tangents in the interval $0 \le x \le 2\pi$? If so, where?

3) _____

**Write the function in the form y = f(u) and u = g(x). Then find dy/dx as a function of x.**

4) $y = \cos^6 x$

4) _____

5) $y = \tan\left(\pi - \dfrac{9}{x}\right)$

5) _____

6) $y = (-3x + 7)^5$

6) _____

**Find $\dfrac{d^2y}{dx^2}$ for the given function.**

7) $y = 3\cot\left(\dfrac{x}{10}\right)$

7) _____

8) $y = -2x^4(3x + 8)^2$

8) _____

**Find the value(s) of x for which the slope of the curve y = f(x) is 0.**

9) $f(x) = \dfrac{x - x^2}{2x^2 + 6}$

9) _____

2

**Find the indicated derivative.**

10) Find $y''$ if $y = 6x \sin x$.

10) _____

**Find the value(s) of x for which the slope of the curve $y = f(x)$ is 0.**

11) $f(x) = \dfrac{8x^2}{x^2 + 1}$

11) _____

**Find the derivative.**

12) $s = 2t^2 + 7t + 4$

12) _____

**Find the derivative of the function.**

13) $q = \sqrt{20r - r^7}$

13) _____

**Find the derivative.**

14) $p = \dfrac{\sec q + \csc q}{\csc q}$

14) _____

**Find the derivative of the function.**

15) $g(x) = \dfrac{x^2 + 5}{x^2 + 6x}$

15) _____

**Find the derivative.**

16) $y = 6 - 3x^2$

16) _____

17) $y = \dfrac{2}{\sin x} + \dfrac{1}{\cot x}$

17) _____

**Find the derivative of the function.**

18) $f(t) = (6 - t)(6 + t^3)^{-1}$

18) _____

19) $r = (\sec \theta + \tan \theta)^{-3}$

19) _____

**Provide an appropriate response.**

20) Find all points $(x, y)$ on the graph of $y = \dfrac{x}{(x - 7)}$ with tangent lines perpendicular to the line $y = 7x - 2$.

20) _____

21) Find an equation for the tangent to the curve $y = \dfrac{27}{x^2 + 2}$ at the point (1, 9).        21) _____

22) The curve $y = ax^2 + bx + c$ passes through the point (2, 8) and is tangent to the line $y = 2x$    22) _____
at the origin. Find a, b, and c.

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

23) $s = 5t^2 + 3t + 7, 0 \leq t \leq 2$                                                                23) _____
Find the body's speed and acceleration at the end of the time interval.

**Find the second derivative of the function.**

24) $y = \dfrac{x^4 + 7}{x^2}$

24) _____

**Given y = f(u) and u = g(x), find dy/dx = f'(g(x))g'(x).**

25) $y = \dfrac{1}{u^2}$, $u = 6x - 5$

25) _____

26) $y = \sin u$, $u = \cos x$

26) _____

**Find y'.**

27) $y = (x^2 - 2x + 2)(4x^3 - x^2 + 5)$

27) _____

**Find dy/dt.**

28) $y = \cos(\sqrt{8t + 11})$

28) _____

**Find y ′.**

29) $y = \left(\dfrac{2}{x} + x\right)\left(\dfrac{2}{x} - x\right)$

29) _____

**Find dy/dt.**

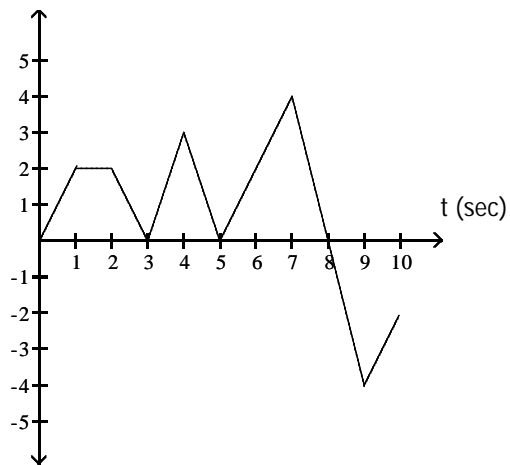30) $y = 5t(3t + 3)^4$

30) _____

**Find the second derivative.**

31) $y = 8x^4 - 7x^2 + 7$

31) _____

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

32)     s (m)

32) _____



When is the body moving forward?

**Find an equation of the tangent line at x = a.**

33) $y = x - x^2; \ a = 4$

33) _____

1) $4

2) 64 ft/sec;  128 ft/sec

3) Yes, at x = 0, x = $\pi$, x = $2\pi$

4) $y = u^6$; $u = \cos x$; $\dfrac{dy}{dx} = -6\cos^5 x \sin x$

5) $y = \tan u$; $u = \pi - \dfrac{9}{x}$; $\dfrac{dy}{dx} = \dfrac{9}{x^2}\sec^2\left(\pi - \dfrac{9}{x}\right)$

6) $y = u^5$; $u = -3x + 7$; $\dfrac{dy}{dx} = -15(-3x + 7)^4$

7) $\dfrac{3}{50}\csc^2\left(\dfrac{x}{10}\right)\cot\left(\dfrac{x}{10}\right)$

8) $-540x^4 - 1920x^3 - 1536x^2$

9) $x = -3 \pm 2\sqrt{3}$

10) $y'' = 12\cos x - 6x\sin x$

11) $x = 0$

12) $4t + 7$

13) $\dfrac{20 - 7r^6}{2\sqrt{20r - r^7}}$

14) $\dfrac{dp}{dq} = \sec^2 q$

15) $g'(x) = \dfrac{6x^2 - 10x - 30}{x^2(x + 6)^2}$

16) $-6x$

17) $y' = -2\csc x \cot x + \sec^2 x$

18) $f'(t) = \dfrac{2t^3 - 18t^2 - 6}{(6 + t^3)^2}$

19) $\dfrac{-3\sec\theta}{(\sec\theta + \tan\theta)^3}$

20) (0, 0), (14, 2)

21) $y = -6x + 15$

22) $a = 1$, $b = 2$, $c = 0$

23) 23 m/sec, 10 m/sec$^2$

24) $\dfrac{d^2y}{dx^2} = 2 + \dfrac{42}{x^4}$

25) $-\dfrac{12}{(6x - 5)^3}$

26) $-\cos(\cos x)\sin x$

27) $20x^4 - 36x^3 + 30x^2 + 6x - 10$

28) $\dfrac{4}{\sqrt{8t + 11}}\sin(\sqrt{8t + 11})$

29) $-\dfrac{8}{x^3} - 2x$

30) $5(3t + 3)^3(15t + 3)$

31) $96x^2 - 14$

32) $0 < t < 1, 3 < t < 4, 5 < t < 7, 9 < t < 10$

33) $y = -7x + 16$