Unit 2 Review

Solve the problem.

1) How long will it take for the value of an account to be \$890 if \$350 is deposited at 11% interest compounded continuously? Round your answer to the nearest hundredth. $A = Pe^{rt}$.

2) Suppose that \$8000 is invested at an interest rate of 5.5% per year, compounded continuously. How long would it take to double the investment? $A = Pe^{rt}$.

Find f′(x).

3) $f(x) = -2e^{x} + 7x - 4$

4) $f(x) = -6 \ln x - x^{3} + 2$

5) $f(x) = 4 \ln x + \ln x^{7} + 4e^{x}$

Find $\frac{dy}{dx}$ for the indicated function y.

6) $y = 2^{x}$

7) $y = 2x^{3} - \log_{5} x$

8) $y = -8 \ln x + 9 \log x$

9) $y = 4^{x} - e^{5}$

Find the equation of the line tangent to the graph of f at the indicated value of x.

10) $f(x) = 1 + 4e^{x}$; $x = 1$

Differentiate.

11) Find f'(x) for $f(x) = (5x^{3} + 4)(3x^{7} - 5)$.

12) Let f and g be functions that satisfy: $f(4) = -1$, $g(4) = 3$, $f'(4) = 2$, and $g'(4) = -3$. Find h'(4) for $h(x) = f(x)g(x) - 2f(x) + 7$.

13) Find f'(t) for $f(x) = \dfrac{x}{7x - 5}$

14) Find f'(t) for $f(x) = \dfrac{2x - 7}{3x - 2}$.

Provide an appropriate response.

15) Find the values of x where the tangent line is horizontal for the graph of $f(x) = \dfrac{4x^{2}}{x + 2}$.

Find the derivative.

16) Find f'(x) for $f(x) = (8x - 9)^{-4}$.

17) Find: $\frac{dy}{dx}\left(\sqrt[8]{8x^7 - 10}\right)$

Provide an appropriate response.

18) Find $\frac{dy}{dx}$ for $y = \ln(7x^3 - x^2)$

19) Find f'(x) for $f(x) = (\ln x)^8$

Find the equation of the tangent line to the graph of the given function at the given value of x.

20) $f(x) = (x^2 + 28)^{4/5}$; $x = 2$

Find all values of x for the given function where the tangent line is horizontal.

21) $f(x) = \frac{x}{(x^2 + 7)^3}$

Provide an appropriate response.

22) Find y' for y = y(x) defined implicitly by $5y^2 - 8x^4 + 3 = 0$, and evaluate y' at (x, y) = (1, 1).

23) Find dy/dx by implicit differentiation.
$2xy - y^2 = 1$

24) Find dy/dx by implicit differentiation.
$x^3 + 3x^2y + y^3 = 8$

25) Find the equation(s) of the tangent line(s) to the graph of $y^2 - xy + 3 = 0$ at $x = -4$.

26) Assume x = x(t) and y = y(t). Find $\frac{dx}{dt}$ if $x^2(y - 6) = 12y + 3$ and $\frac{dy}{dt} = 2$ when x = 5 and y = 12.

27) Evaluate dy/dt for the function at the point.
$\frac{x + y}{x - y} = x^2 + y^2$; dx/dt = 12, x = 1, y = 0

28) A 26-foot ladder is placed against a wall. If the top of the ladder is sliding down the wall at 2 feet per second, at what rate is the bottom of the ladder moving away from the wall when the bottom of the ladder is 10 feet away from the wall?

29) Find the relative rate of change of $f(x) = 150x - 0.08x^2$.

Find the percentage rate of change of f(x) at the indicated value of x. Round to the nearest tenth of a percent.

30) $f(x) = 200 + 50x$; $x = 3$

Find the elasticity of the demand function as a function of p.

31) $x = D(p) = 300 - p$

Use the price–demand equation to determine whether demand is elastic, is inelastic, or has unit elasticity at the indicated values of p.

32) $x = f(p) = 430 - 5p$; $p = 60$.

Use the price–demand equation to find the values of p which meet the given condition of elasticity.

33) $x = f(p) = 432 - 9p$; determine the values of p for which demand has unit elasticity. Round to two decimal places if necessary.

34) $x = f(p) = 216 - 2p^2$; determine the values of p for which demand is elastic and the values of p for which demand is inelastic..

Use the demand equation to find the revenue function.

35) $x = f(p) = 30(15 - p)$

Solve the problem.

36) A company is manufacturing a new digital watch and can sell all it manufactures. The cost (in dollars) is given by $C(x) = 5000 + 2x$, where the production output in one day is x watches. If production is increasing at 5 watches per day when production is 375 watches per day, find the rate of increase in cost.

37) Given the revenue and cost functions $R = 26x - 0.3x^2$ and $C = 3x + 10$, where x is the daily production, find the rate of change of profit with respect to time when 20 units are produced and the rate of change of production is 7 units per day per day.

1) 8.48 yr
2) 12.6 yr
3) $-2e^{x} + 7$
4) $-\frac{6}{x} - 3x^{2}$
5) $\frac{11}{x} + 4e^{x}$
6) $2^{x} \ln 2$
7) $6x^{2} - \frac{1}{x \ln 5}$
8) $-\frac{8}{x} + \frac{9}{x \ln 10}$
9) $4^{x} \ln 4$
10) $y = 4ex + 1$
11) $f'(x) = 150x^{9} + 84x^{6} - 75x^{2}$
12) 5
13) $-\frac{5}{(7x - 5)^{2}}$
14) $\frac{17}{(3x - 2)^{2}}$
15) $x = 0, x = -4$
16) $-\frac{32}{(8x - 9)^{5}}$
17) $\frac{7x^{6}}{(8x^{7} - 10)^{7/8}}$
18) $\frac{21x - 2}{7x^{2} - x}$
19) $\frac{8 \ln^{7} x}{x}$
20) $y = \frac{8}{5}x + \frac{64}{5}$
21) $\pm \frac{\sqrt{35}}{5}$
22) $y' = \frac{16x^{3}}{5y}; y'\big|_{(1, 1)} = \frac{16}{5}$
23) $\frac{dy}{dx} = \frac{y}{y - x}$
24) $\frac{dy}{dx} = -\frac{x^{2} + 2xy}{x^{2} + y^{2}}$
25) $y = \frac{3}{2}x + 3$ and $y = -\frac{1}{2}x - 3$
26) $-\frac{13}{30}$

27) 12
28) 4.8 ft/sec
29) $\dfrac{150 - 0.16x}{150x - 0.08x^2}$
30) 14.3%
31) $E(p) = \dfrac{p}{300 - p}$
32) Elastic
33) Inelastic at $p = 24$
34) Elastic on $(6, 6\sqrt{3})$, inelastic on $(0, 6)$
35) $R(p) = 450p - 30p^2$
36) $10 per day
37) $77.00 per day