Business Calculus.
Practice Chapter 1
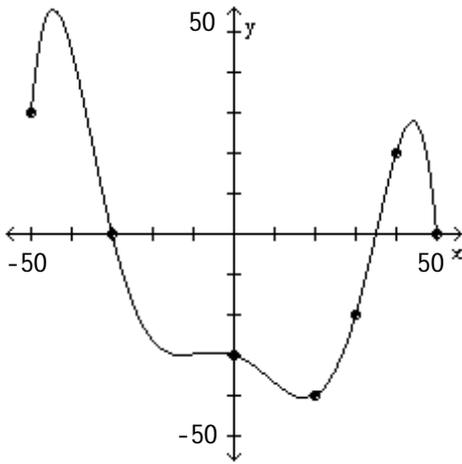
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Sketch the graph of the equation.

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

The graph of a function f is given. Use the graph to answer the question.
2) a) find f(-50). b) find local max and local mins
    c) Intervals in which the function is increasing d)Inter vals in which the function is decreasing
    e) indicate the x and y intercepts.

Find the function value.

3) Given that $f(x) = 5x^2 - 2x$, find $f(t + 2)$.   3) _____
   A) $5t^2 - 18t + 16$ B) $3t + 6$ C) $t^2 + 2t - 6$ D) $5t^2 + 18t + 16$

Provide an appropriate response.

4) For $f(t) = 3t + 2$ and $g(t) = 2 - t^2$, find $4f(3) - g(-3) + g(0)$.   4) _____

Compute and simplify the difference quotient $\dfrac{f(x + h) - f(x)}{h}$, $h \neq 0$.

5) $f(x) = 5x^2 + 7x$ 5) _____
   A) $10x^2 + 5h + 7x$ B) $10x + 7$ C) $10x + 5h + 7$ D) $15x - 7h + 14$

Determine the domain of the function.

6) $f(x) = -7x + 9$

7) $f(x) = \dfrac{x}{x - 2}$

8) $f(x) = \sqrt{3 - x}$

9) $f(x) = \dfrac{8}{x^3}$

Provide an appropriate response.

10) Only one of the following functions has domain which is not equal to all real numbers. Stat   10) _____
   which function and state its domain.

   (A) $h(x) = 4x^2 - 3x - 5$ (B) $f(x) = \dfrac{2x}{48 - x}$ (C) $g(x) = \dfrac{x + 7}{2}$

Solve the problem.

11) The function F described by $F(x) = 2.75x + 71.48$ can be used to estimate the height, in centimeters,   11) _____
   of a woman whose humerus (the bone from the elbow to the shoulder) is x cm long. Estimate the
   height of a woman whose humerus is 30.93 cm long. Round your answer to the nearest four
   decimal places.
      A) 105.1600 cm   B) 43.3000 cm   C) 13.5775 cm   D) 156.5375 cm

12) The function M described by $M(x) = 2.89x + 70.64$ can be used to estimate the height, in   12) _____
   centimeters, of a male whose humerus (the bone from the elbow to the shoulder) is x cm long.
   Estimate the height of a male whose humerus is 30.93 cm long. Round your answer to the nearest
   four decimal places.
      A) 157.3400 m   B) 30.9300 cm   C) 160.0277 cm   D) 156.5375 cm

13) The point at which a company's costs equals its revenue is the break-even. C represents cost, in   13) _____
   dollars, of x units of a product. R represents the revenue, in dollars, for the sale of x units. Find the
   number of units that must be produced and sold in order to break even.
   C = 15x + 12,000
   R = 18x - 6000
      A) 800   B) 545   C) 6000   D) 12,000

Provide an appropriate response.

14) In a profit-loss analysis, point where revenue equals cost.   14) _____
      A) break-even point   B) inflection point
      C) profit-loss point   D) turning point

Give the domain and range of the function.

15) $f(x) = x^2 + 2$

16) $h(x) = -4|x|$

17) $s(x) = \sqrt{1 - x}$

18) $r(x) = |x - 6| - 4$

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Graph the function.

19)
$$f(x) = \begin{cases} x - 2 & \text{if } x < 1 \\ -3 & \text{if } x \geq 1 \end{cases}$$

20)
$$f(x) = \begin{cases} -x + 3 & \text{if } x < 2 \\ 2x - 3 & \text{if } x \geq 2 \end{cases}$$

21) Assume it costs 25 cents to mail a letter weighing one ounce or less, and then 20 cents for each additional ounce or fraction of an ounce. Let $L(x)$ be the cost of mailing a letter weighing x ounces. Graph $y = L(x)$. Use the interval (0, 4].

Provide an appropriate response.

22) If $f(x) = \begin{cases} x - 3 & \text{if } x < 2 \\ x^2 & \text{if } x \geq 2 \end{cases}$, what is the definition of $g(x)$, the function whose graph is

22) _____

obtained by shifting $f(x)$'s graph right 5 units and down 1 unit?

Use interval notation to write the solution set of the inequality.

23) $3x + 5 < 29$

A) (8, ∞)   B) (-∞, 8)   C) [8, ∞)   D) (-∞, 8]

23) _____

24) $-7x - 28 \geq 0$

A) [4, ∞)   B) [-4, ∞)   C) (-∞, 4]   D) (-∞, -4]

24) _____

25) $x^2 - 3x - 4 \leq 0$

A) [4, ∞)   B) (-∞, -1]   C) [-1, 4]   D) (-∞, -1] ∪ [4, ∞)

25) _____

26) $x^2 - 7x + 12 > 0$

A) (-∞, 3)   B) (3, 4)   C) (4, ∞)   D) (-∞, 3) ∪ (4, ∞)

26) _____

Solve the problem.

27) The cost of manufacturing a computer part is related to the quantity produced, x, during a production run. When 100 parts are produced, the cost is $300. When 600 parts are produced, the cost is $4800. Find an equation of the line relating quantity produced to cost. Write the final answer in the form $C = mx + b$.

A) $C = 9x$ B) $C = 9x - 600$ C) $C = 9x + 600$ D) $C = 600x + 9$

27) _____

28) The cost for labor associated with fixing a washing machine is computed as follows: There is a fixed charge of $25 for the repairman to come to the house, to which a charge of $20 per hour is added. Find an equation that can be used to determine the labor cost, C, of a repair that takes x hours. Write the final answer in the form $C = mx + b$.

A) $C = -20x + 25$ B) $C = 25x + 20$ C) $C = 45x$ D) $C = 20x + 25$

28) _____

29) A small company that makes hand-sewn leather shoes has fixed costs of $320 a day, and total   29) _____
costs of $1200 per day at an output of 20 pairs of shoes per day. Assume that total cost C is linearly
related to output x. Find an equation of the line relating output to cost. Write the final answer in
the form C = mx + b.

    A) C = 44x + 320   B) C = 44x + 1520   C) C = 60x + 1520   D) C = 60x + 320

30) Using a phone card to make a long distance call costs a flat fee of $0.85 plus per $0.19 minute   30) _____
starting with the first minute. Find the total cost of a phone call which lasts 8 minutes.

    A) $1.52   B) $8.16   C) $6.00   D) $2.37

31) The mathematical model C = 600 x + 30,000 represents the cost in dollars a company has in   31) _____
manufacturing x items during a month. Using this model, how much does it cost to produce 600
items?

    A) $0.08   B) $390,000   C) $50.00   D) $360,000

32) In economics, functions that involve revenue, cost and profit are used. Suppose R(x) and C(x)   32) _____
denote the total revenue and the total cost, respectively, of producing a new high-tech widget. The
difference P(x) = R(x) - C(x) represents the total profit for producing x widgets. Given R(x) = 60x -
0.4 x^2 and C(x) = 3x + 13, find the equation for P(x).

    A) P(x) = 3x + 13   B) P(x) = -0.4 x^2 + 57x - 13
    C) P(x) = 60x - 0.4 x^2 D) P(x) = -0.4 x^2 + 63x + 13

33) In economics, functions that involve revenue, cost and profit are used. Suppose R(x) and C(x)   33) _____
denote the total revenue and the total cost, respectively, of producing a new high-tech widget. The
difference P(x) = R(x) - C(x) represents the total profit for producing x widgets. Given R(x) = 60x -
0.4 x^2 and C(x) = 3x + 13, find P(100).

    A) 313   B) 55687   C) 1687   D) 2000

34) A professional basketball player has a vertical leap of 37 inches. A formula relating an athlete's   34) _____
vertical leap V, in inches, to hang time T, in seconds, is V= 48T^2. What is his hang time? Round to
the nearest tenth.

    A) 0.9 sec   B) 1 sec   C) 0.6 sec   D) 0.8 sec

35) Under certain conditions, the power P, in watts per hour, generated by a windmill with winds   35) _____
blowing v miles per hour is given by P(v) = 0.015v^3. Find the power generated by 18-mph winds.

    A) 58.32 watts per hour   B) 0.00006075 watts per hour
    C) 4.86 watts per hour   D) 87.48 watts per hour

36) The U. S. Census Bureau compiles data on population. The population (in thousands) of a   36) _____
southern city can be approximated by P(x) = 0.08x^2 - 13.08x + 927, where x corresponds to the
years after 1950. In what calendar year was the population about 804,200?

    A) 2000   B) 1955   C) 1960   D) 1965

Use the REGRESSION feature on a graphing calculator.

37) In the table below, x represents the number of years since 2000 and y represents sales (in thousands of dollars) of a clothing company. Use the regression equation to estimate sales in the year 2006. Round to the nearest thousand dollars.

37) _____

Year x	1	2	3	4	5
Sales y	84	76	39	30	26

    A) $8,000   B) $20,000   C) $14,000   D) $2,000

38) For some reason the quality of production decreased as the year progressed at a flash drive manufacturing plant. The following data represent the percentage of defective flash drives produced at the plant in the corresponding month of the year.

38) _____

Month, x	2	3	5	7	8	9	12
% defective, y	1.3	1.6	2.0	2.4	2.6	2.8	3.1

Use the regression equation with values rounded to four decimals to predict the percentage of defec drives in month 6, June.

    A) 2.0%   B) 2.15%   C) 2.3%   D) 2.20%

Solve the problem.

39) Suppose the sales of a particular brand of MP3 player satisfy the relationship $S = 200x + 3800$, where S represents the number of sales in year x, with $x = 0$ corresponding to 2002 . Find the number of sales in 2005.

39) _____

    A) 4400   B) 12,600   C) 6400   D) 4200

40) The population P, in thousands, of Fayetteville is given by $P(t) = \dfrac{300t}{2t^2 + 7}$, where t is the time, in months. Find the population at 9 months.

40) _____

    A) 40,000   B) 30, 769   C) 7988   D) 15, 976

41) If the average cost per unit C(x) to produce x units of plywood is given by $C(x) = \dfrac{1200}{x + 40}$, what is the unit cost for 10 units?

41) _____

    A) $80.00   B) $120.00   C) $24.00   D) $3.00

42) The financial department of a company that manufactures portable MP3 players arrived at the following daily cost equation for manufacturing x MP3 players per day: $C(x) = 1500 + 105x + x^2$. The average cost per unit at a production level of players per day is $\overline{C}(x) = \dfrac{C(x)}{x}$.

42) _____

(A) Find the rational function $\overline{C}$.
(B) Graph the average cost function on a graphing utility for $10 \le x \le 200$.
(C) Use the appropriate command on a graphing utility to find the daily production level (t nearest integer) at which the average cost per player is a minimum. What is the minimum average cost (to the nearest cent)?

For the polynomial function find the following: (i) Degree of the polynomial; (ii) All x intercepts; (iii) The y intercept.

43) $y = (x + 6)(x + 7)(x + 8)$ 43) _____

    A) (i) 3   B) (i) 3   C) (i) 3   D) (i) 3

       (ii) 6, 7, 8   (ii) 6, 7, 8   (ii) -6, -7, -8   (ii) -6, -7, -8

       (iii) 56   (iii) 336   (iii) 336   (iii) -56

44) $f(x) = (x^6 + 7)(x^{10} + 9)$ 44) _____
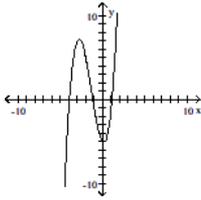
    A) (i) 16   B) (i) 60   C) (i) 16   D) (i) 60

       (ii) none   (ii) 7, 9   (ii) 7, 9   (ii) none

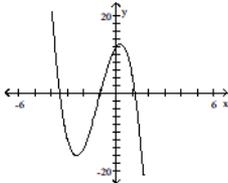   (iii) 63   (iii) -63   (iii) 63   (iii) -63

The graph that follows is the graph of a polynomial function. (i) What is the minimum degree of a polynomial function that could have the graph? (ii) Is the leading coefficient of the polynomial negative or positive?

45)

46)

Provide an appropriate response.

47) What is the minimum number of x intercepts that a polynomial of degree 11 can have? Explain.   47) _____

    A) 11 because this is the degree of the polynomial.

    B) 0 because a polynomial of odd degree may not cross the x axis at all.

    C) 1 because a polynomial of odd degree crosses the x axis at least once.

    D) Not enough information is given.

48) What is the minimum number of x intercepts that a polynomial of degree 8 can have? Explain.   48) _____

    A) 0 because a polynomial of even degree may not cross the x axis at all.

    B) 8 because this is the degree of the polynomial.

    C) 1 because a polynomial of even degree crosses the x axis at least once.

    D) Not enough information is given.

For the rational function below (i) Find the intercepts for the graph; (ii) Determine the domain; (iii) Find any vertical or horizontal asymptotes for the graph; (iv) Sketch any asymptotes as dashed lines. Then sketch the graph of y = f(x).

49) $f(x) = \dfrac{x + 2}{x + 1}$

For the rational function below (i) Find any intercepts for the graph; (ii) Find any vertical and horizontal asymptotes for the graph; (iii) Sketch any asymptotes as dashed lines. Then sketch a graph of f.

50) $y = \dfrac{6}{x^2 - 1}$

Sketch the graph of the function.

51) $f(x) = \dfrac{x + 1}{x^2 + x - 12}$

Find the equation of any horizontal asymptote.

52) $f(x) = \dfrac{8x^2 - 7x - 2}{5x^2 - 2x + 9}$

53) $f(x) = \dfrac{7x^2 + 2}{7x^2 - 2}$

54) $f(x) = \dfrac{x^2 + 7x - 2}{x - 2}$

Sketch the graph of the function.

55) $f(x) = \dfrac{x + 1}{x^2 + x - 12}$

Find the equations of any vertical asymptotes.

56) $f(x) = \dfrac{3x - 11}{x^2 + 4x - 5}$

57) $f(x) = \dfrac{x^2 - 100}{(x - 4)(x + 4)}$

58) $f(x) = \dfrac{x - 4}{x^2 + 7}$

Solve the equation.

59) Solve for x: $2^{4x} = 8^{x+5}$

60) Solve for x: $(e^x)^x \cdot e^{24} = e^{11x}$

61) Solve for t: $e^{-0.07t} = 0.05$ Round your answer to four decimal places.

Convert to a logarithmic equation.

62) $2^3 = 8$

63) $e^t = 7$

Convert to an exponential equation.

64) $\log_8 512 = t$

65) $\ln 44 = 3.7842$

Evaluate.

66) $\log_8 8^4$

Solve for x to two decimal places (using a calculator).

67) $700 = 500(1.04)^x$

68) $5.2 = 1.006^{12x}$

Use the properties of logarithms to solve.

69) $\log_7 x + \log_7 (x - 2) = \log_7 24$

70) $\log_b x - \log_b 5 = \log_b 2 - \log_b (x - 3)$

71) $\log_b (x + 3) + \log_b x = \log_b 54$

72) $\log_6 (4x - 5) = 1$