

PRACTICE PROBLEMS

Section I:

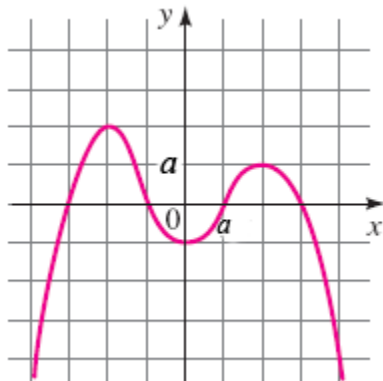
- Use the model given to answer the questions about the object or process being modeled.
 - A company models the profit P (in dollars) on the sale of x CDs by the formula $P = 0.5x - 550$. Find the profit on the sale of 1500 CDs.
 - A company finds that the cost C (in dollars) of manufacturing x compact discs is modeled by $C = 500 + 0.35x$. Find the cost of manufacturing 1000 compact discs.
 - A company models the profit P (in dollars) on the sale of x CDs by the formula $P = 0.1x - 520$. Find the profit on the sale of 12,000 CDs.
 - A company finds that the cost C (in dollars) of manufacturing x compact discs is modeled by $C = 300 + 0.25x$. Find the cost of manufacturing 1300 compact discs.
- Evaluate each expression
 - $||-5| - |-4||$
 - $\frac{-9}{|-9|}$
 - $|2| + |-12 + 14|$
 - $|-15 + 6| - |15|$
- Simplify the expression. Assume the letters denote any positive real numbers.
 - $\sqrt[4]{x^4y^2z^2}$
 - $\sqrt{54x^4y}$
 - $\sqrt[3]{8x^9y^3}$
 - $\sqrt{196x^9y^6}$
- Use a Special Factoring Formula to factor the expression completely:
 - $81a^2 - 100$
 - $a^2 + 8a + 16$
 - $27a^3 - 1$
 - $9a^2 - 6a + 1$
- Perform the multiplication or division and simplify
 - $\frac{4y^2-9}{2y^2+11y-21} \div \frac{2y^2+y-3}{y^2+6y-7}$
 - $\frac{6a^2b}{12b^2} \div \frac{9ab}{16b^2}$
 - $\frac{4y^2-9}{2y^2+11y-21} \times \frac{2y^2+y-3}{y^2+6y-7}$
 - $\frac{y^2-1}{y^2+y-2} \times \frac{y^2-y-6}{y^2+5y+4}$
- Perform the addition or subtraction and simplify
 - $\frac{1}{x+4} + \frac{1}{x-4}$
 - $\frac{2}{x+4} + \frac{1}{x-3}$
 - $\frac{1}{x+4} - \frac{1}{x-4}$

- d. $\frac{x}{(x+4)^2} + \frac{2}{x+4}$
7. Solve the equation:
- $8(1 - x) = 3(1 + 2x) + 8$
 - $7x - 5(8x - 4) = x + 3$
 - $7(2x - 1) - x = 5(x + 5)$
 - $9(3x + 2) - 10x = 12x - 7$
8. Solve for the indicated variable:
- $v = k + gt$ for t
 - $K = \frac{mv^2}{2g}$ for g
 - $L = 2\pi rh$ for r
 - $A = P + Prt$ for P
9. Find all real solutions of the equation.
- $x^2 - 9x + 20 = 0$
 - $x^2 - 3x = 7$
 - $x^2 + 5x = 3$
 - $-2x = 1 - 4x^2$
10. Evaluate the expression and write the result in the form $a + bi$.
- $(7 + 3i)(-8 - 3i)$
 - $(2 - 4i) + (3 + i)$
 - $\frac{2}{3-i}$
 - $(4 - i) - (2 + 3i)$
11. Solve the linear inequality
- $3x - 14 < 6x + 7$
 - $4x - 3 \geq 3x + 5$
 - $5x + 2 \leq 2(2x - 3)$
 - $8x - 7 > 10x + 3$
12. Solve the equation
- $|x - 5| = |-3x - 10|$
 - $|x + 2| = 9$
 - $|x - 2| = |2x + 1|$
 - $|x - 3| = -2$

Section II:

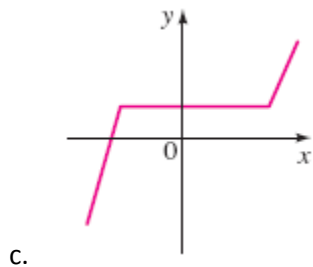
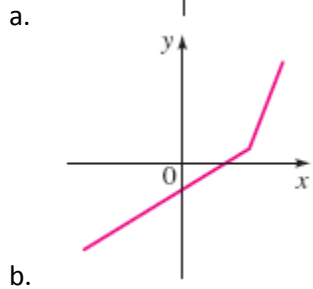
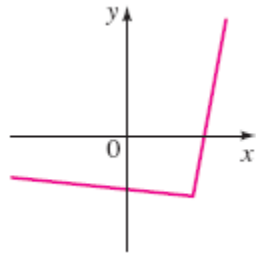
13. Find the distance and midpoint between the points:
- (13,7) and (17,4)
 - (-2,-5) and (11,3)
 - (1,-7) and (-3,8)
 - (9,3) and (2,14)
14. Find the x- and y-intercepts of the line:
- $3x - 4y = 12$
 - $y = 9 - x^2$

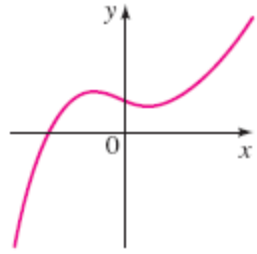
- c. $20 = 5y + 4x$
 d. $4y - 3x = 10$
15. Find the slope between the points:
 a. (13,7) and (17,4)
 b. (-2,-5) and (11,3)
 c. (1,-7) and (-3,8)
 d. (9,3) and (2,14)
16. Hooke's Law states that the force needed to keep a spring stretched x units beyond its natural length is directly proportional to x . Here the constant of proportionality is called the spring constant.
 a. If a spring has a natural length of 15 cm and a force of $F=44$ N is required to maintain the spring stretched to a length of 24 cm, find the spring constant. What force is needed to keep the spring stretched to a length of 18 cm?
 b. If a spring has a natural length of 10 cm and a force of $F=45$ N is required to maintain the spring stretched to a length of 25 cm, find the spring constant. What force is needed to keep the spring stretched to a length of 18 cm?
17. Find the domain of the function using interval notation:
 a. $\frac{x^4}{x^2+x-56}$
 b. $\sqrt{-7x+4}$
 c. $x^3 + x\sqrt{2} + 5$
 d. $\sqrt{x-4}$
18. Evaluate the given function at the indicated values
 a. $f(x) = x^2 + 8x$, $f(0)$, $f(-1)$, $f(2x)$, $f(x+1)$
 b. $f(x) = 9x - 1$, $f(0)$, $f(-1)$, $f(2x)$, $f(x+1)$
 c. $f(x) = \sqrt{x+4}$, $f(0)$, $f(-1)$, $f(2x)$, $f(x+1)$
19.
 a. The graph of a function is given. ($a = 3$), Find all the local maximum and minimum values of the function and the value of x at which each occurs.



- b. A function, $f(x) = x^3 - 100x$ is given. Find all the local maximum and minimum values of the function and the value of x at which each occurs.

- c. A function, $f(x) = x^2 - 5x$ is given. Find all the local maximum and minimum values of the function and the value of x at which each occurs.
- d. A function, $f(x) = 10x^3 - 100x$ is given. Find all the local maximum and minimum values of the function and the value of x at which each occurs.
20. A function f is given and the indicated transformations are applied to its graph (in the given order). Write the equation for the final transformed graph.
- $f(x) = x^2$, stretch vertically by a factor of 8, shift downward 9 units, and shift 3 units to the right
 - $f(x) = \sqrt{x}$, reflected across the x -axis, shift upward 3 units, and shift 2 units to the left
 - $f(x) = x^2$, stretch vertically by a factor of 2, shift upward 5 units, and shift 3 units to the right
 - $f(x) = \sqrt{x}$, reflected across the y -axis, shift upward 3 units, and shift 4 units to the right.
21. Given $f(x) = 2x + 5$, $g(x) = x^2 + 1$, and $h(x) = \sqrt{x + 1}$ Find:
- $(f \circ g)(x)$
 - $(g \circ f)(x)$
 - $(f \circ h)(x)$
 - $(f \circ f)(x)$
22. Which of the following graphs are one-to-one





d.

23. Use the Property of Inverse Functions to find $f^{-1}(x)$

a. $f(x) = 3x + 1$

b. $f(x) = \frac{9-x}{10}$

c. $f(x) = \frac{1}{4}x + 5$

d. $f(x) = \sqrt{x-5}$