dName _____

Advanced Algebra II 1st Semester Exam Review

Chapter 1A: Number Sets & Solving Equations

Name the sets of numbers to which each number belongs.

1. 34 **2.** –525 **3.** 0.875 **4.** $\sqrt{30}$

Solve each equation. Check your solution.

5. $4m + 2 = 18$ **6.** $x + 4 = 5x + 2$ **7.** $a - \frac{2a}{5} = 3$

Solve each equation or formula for the specified variable.

8. $I = prt$, for p **9.** $y = \frac{1}{4}x - 12$, for x **10.** $A = \frac{x + y}{2}$, for y

Chapter 1B: Solving Absolute Value Equations

Evaluate each expression if $w = -4$, $x = 2$, $y = \frac{1}{2}$, and $z = -6$.

1. $|2x - 8|$ **2.** $|6 + z| - |-7|$ **3.** $5 + |w + z|$

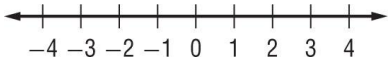
Solve each equation. Check your solutions.

4. $|x + 15| = 37$ **5.** $|t - 4| - 5 = 0$

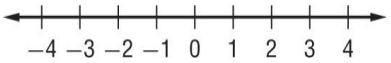
1-5 Solving Inequalities

Solve each inequality. Then graph the solution set on a number line.

1. $7(7a - 9) \leq 84$



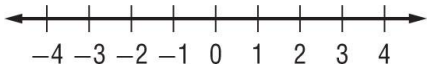
2. $3(9z + 4) > 35z - 4$



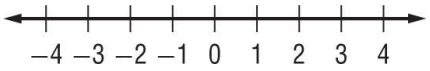
1-6 Solving Compound Inequalities

Solve each inequality. Then graph the solution set on a number line.

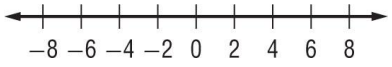
3. $2c + 1 > 5$ or $c < 0$



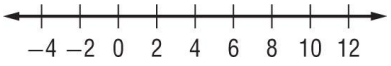
4. $-11 \leq 4y - 3 \leq 1$



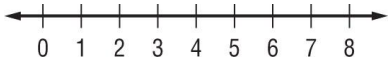
5. $|2f - 11| > 9$



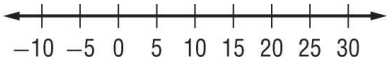
6. $|5w + 2| < 28$



7. $|10 - 2k| < 2$



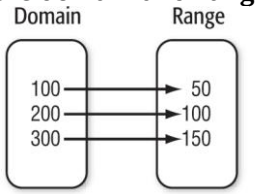
8. $\left|\frac{x}{2} - 5\right| + 2 > 10$



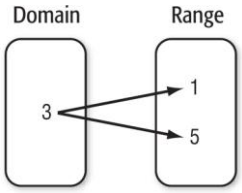
2-1 Relations and Functions

State the domain and range of each relation. Then determine whether each relation is a *function*.

1.



2.

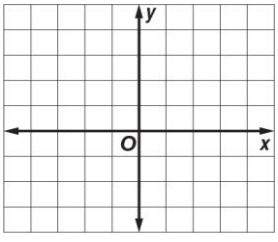


3.

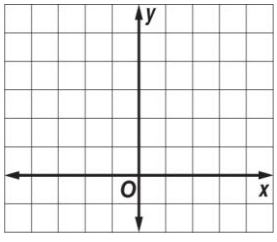
x	*y*
1	2
2	4
3	6

Graph each relation or equation and determine the domain and range. Determine whether the equation is a *function.* Then state whether it is discrete or continuous.

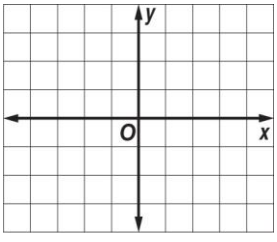
4. {(2, –3), (2, 4), (2, –1)}



5. {(–3, 4), (–2, 4), (–1, –1), (3, –1)}



6. $y = -2x + 3$



Find each value if $f(x) = 2x - 1$ and $g(x) = 2 - x^2$.

7. $f(0)$

8. $f(12)$

9. $g(4)$

10. $f(-2)$

11. $g(-1)$

12. $f(d)$

2-2 Linear Relations and Functions

State whether each function is a linear function. If not, explain why.

1. $y = 3x$

2. $y = -2 + 5x$

3. $2x + y = 10$

4. $f(x) = 4x^2$

5. $-\frac{3}{x} + y = 15$

6. $x = y + 8$

Write each equation in standard form.

7. $\frac{1}{2}y = \frac{1}{4}x - 5$

8. $y = 5x + 1$

9. $2x = 4 - 7y$

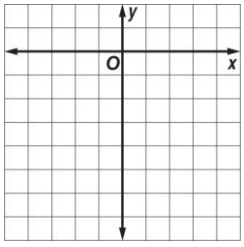
10. $3x = -2y - 2$

11. $5y - 9 = 0$

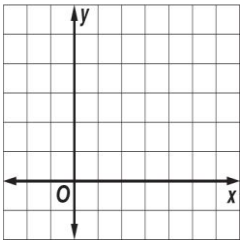
12. $-0.6y + 1.4 = 0.8x$

Find the *x*-intercept and the *y*-intercept of the graph of each equation. Then graph the equation using the intercepts.

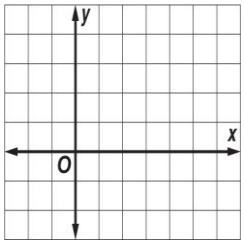
13. $y = 3x - 6$



14. $x + y = 5$



15. $2x + 5y = 10$



2-3 Rate of Change and Slope

Find the slope of the line that passes through each pair of points.

1. (1, 5), (–1, –3)

2. (0, 2), (3, 0)

3. (1, 9), (0, 6)

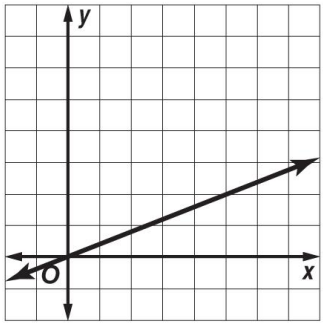
4. (8, –5), (4, –2)

5. (–3, 5), (–3, –1)

6. (–2, –2), (10, –2)

Determine the rate of change of each graph.

7.



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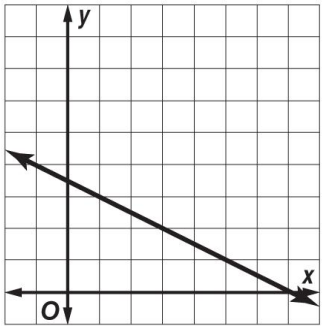

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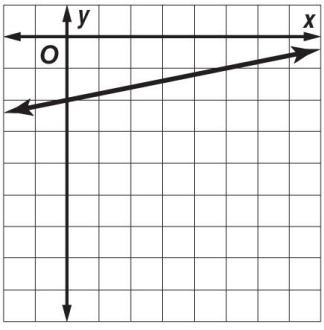


10. HIKING Naomi left from an elevation of 7400 feet at 7:00 A.M. and hiked to an elevation of 9800 feet by 11:00 A.M. What was her rate of change in altitude?

2-4 Writing Linear Equations

Write an equation in slope-intercept form for the line described.

1. slope 3, *y*-intercept at –4

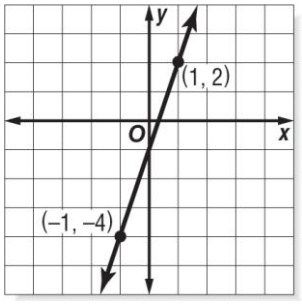
2. perpendicular to $y = \frac{1}{2} - 1$, passes through (4, 0)

3. parallel to $y = \frac{2}{3}x + 6$, passes through (6, 7)

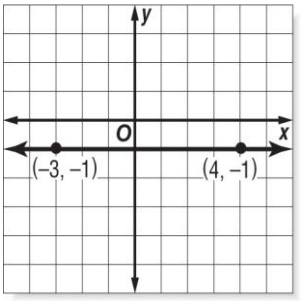
4. slope $\frac{5}{6}$, passes through (12, 4)

Write an equation in slope-intercept form for each graph.

5.



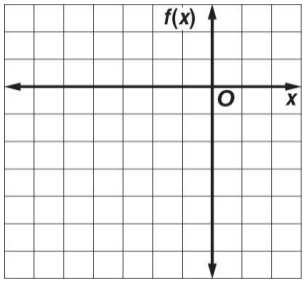
6.



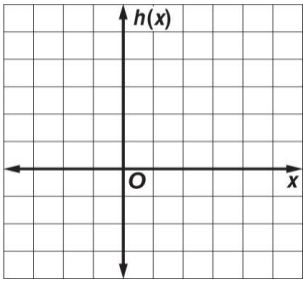
2-6 Special Functions

Graph each function. Identify the domain and range.

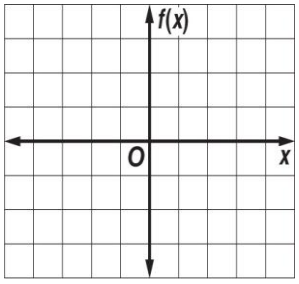
1. $f(x) = \begin{cases} x + 2 \text{ if } x \leq -2 \\ 3x \text{ if } x > -2 \end{cases}$



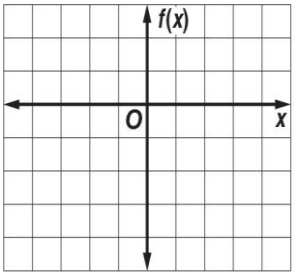
2. $h(x) = \begin{cases} 4 - x \text{ if } x > 0 \\ -2x - 2 \text{ if } x < 0 \end{cases}$



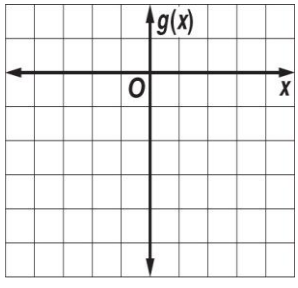
3. $f(x) = [\![0.5x]\!]$



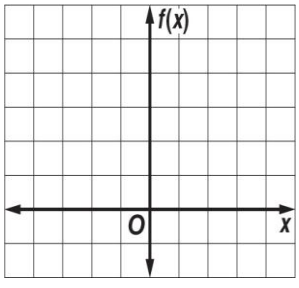
4. $f(x) = [\![x]\!] - 2$



5. $g(x) = -2\,|x|$



6. $f(x) < |x + 1|$ **(INEQUALITY)**

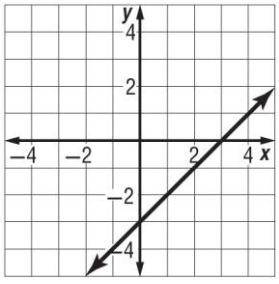


7. BUSINESS *A Stitch in Time* charges $40 per hour or any fraction thereof for labor. Draw a graph of the step function that represents this situation.

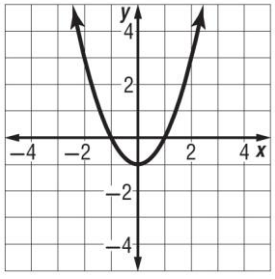
2-7 Parent Functions and Transformation

Identify the type of function represented by each graph.

1.

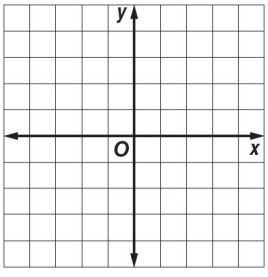


2.

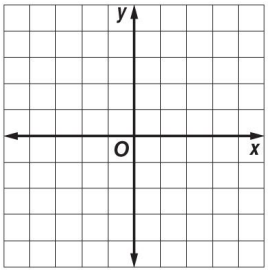


Describe the translation in each equation. Then graph the function.

3. $y = |x| - 2$

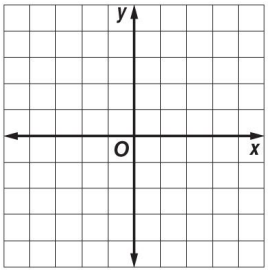


4. $y = (x + 1)^2$

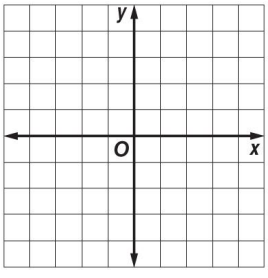


Describe the reflection in each equation. Then graph the function.

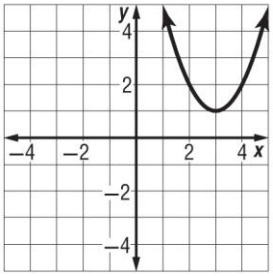
5. $y = -x$



6. $y = -|x|$



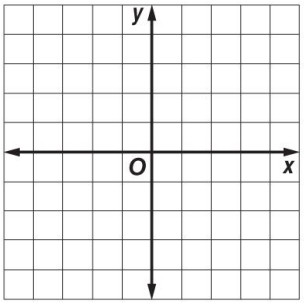
7. Biology A biologist plotted the data from his latest experiment and found that the graph of his data looked like this graph. What type of function relates the variables in the experiment?



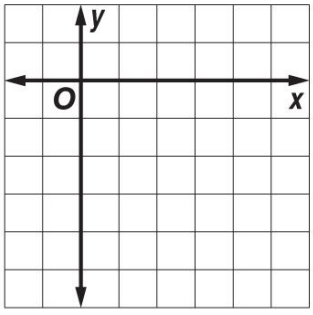
2-8Graphing Linear Inequalities

Graph each inequality.

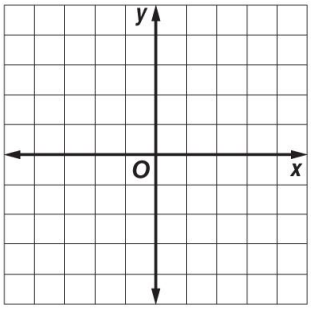
1. $y < 3x + 1$



2. $y \geq x - 5$



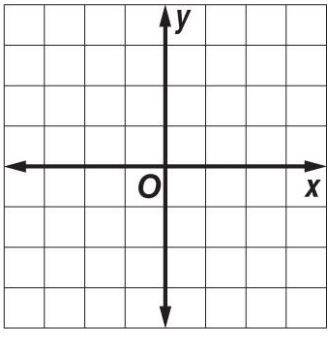
3. $4x + y \leq -1$



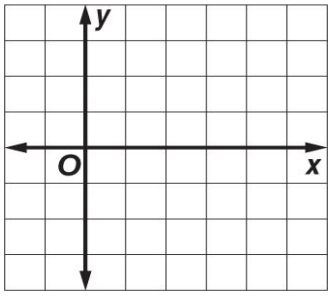
3-1 Solving Systems of Equations

Graph each system of equations and describe it as *consistent and independent, consistent and dependent,* or *inconsistent*.

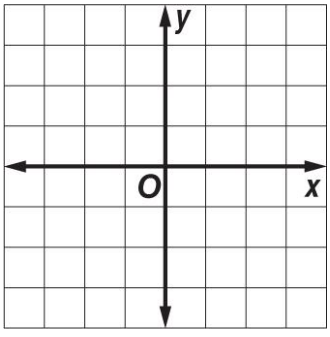
1. $3x + y = -2$
$6x + 2y = 10$



2. $x + 2y = 5$
$3x - 15 = -6y$



3. $2x - 3y = 0$
$4x - 6y = 3$



Solve each system of equations by substitution or elimination.

4. $3x + y = 7$
$4x + 2y = 16$

5. $2x + y = 5$
$3x - 3y = 3$

6. $2x + 3y = -3$
$x + 2y = 2$

7. $2x - y = 7$
$6x - 3y = 14$

8. $4x - y = 6$
$2x - \frac{y}{2} = 4$

9. $5x + 2y = 12$
$-6x - 2y = -14$

3-4 Systems of Equations in Three Variables

Solve each system of equations.

1. $3x - y - z = 5$
$3x + 2y - z = 11$
$6x - 3y + 2z = -12$

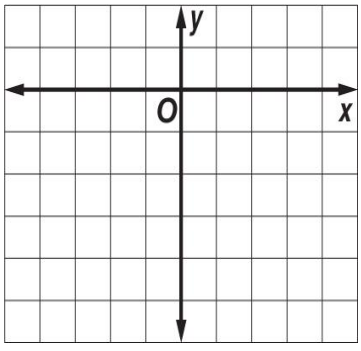
2. $2x - 4y - z = 10$
$4x - 8y - 2z = 16$
$3x + y + z = 12$

3. $x - 6y + 4z = 2$
$2x + 4y - 8z = 16$
$x - 2y = 5$

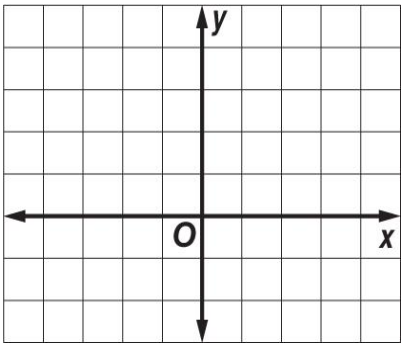
3-2 Solving Systems of Inequalities

Solve each system of inequalities by graphing.

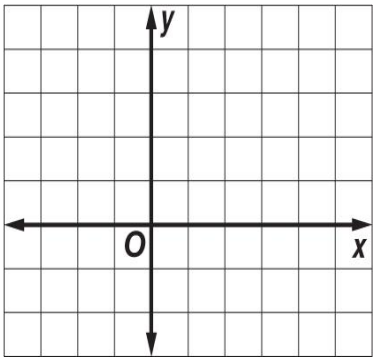
1. $y \geq \frac{x}{2} - 3$
$y < 2x$



2. $y < \frac{x}{3} + 2$
$y < -2x + 1$



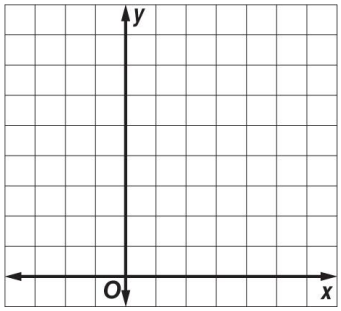
3. $y \geq -\frac{x}{4} + 1$
$y < 3x - 1$



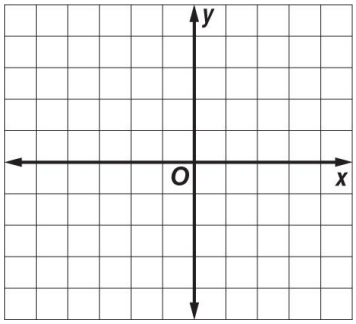
3-3 Linear Programming

Graph each system of inequalities. Name the coordinates of the vertices of the feasible region. Find the maximum and minimum values of the given function for this region.

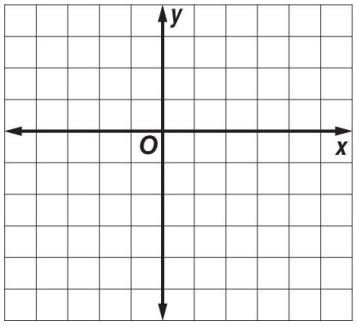
1. $y \geq 2$
$1 \leq x \leq 5$
$y \leq x + 3$
$f(x, y) = 3x - 2y$



2. $y \geq -2$
$y \geq 2x - 4$
$x - 2y \geq -1$
$f(x, y) = 4x - y$



3. $x + y \geq 2$
$4y \leq x + 8$
$y \geq 2x - 5$
$f(x, y) = 4x + 3y$

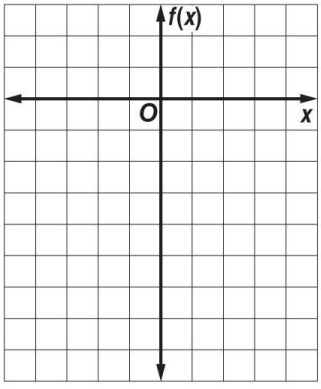


4-1 Graphing Quadratic Functions

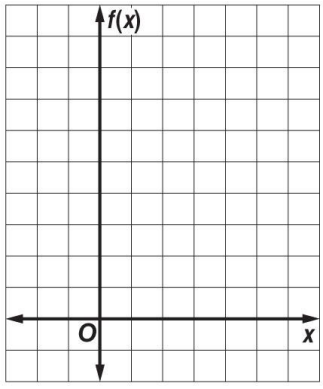
Complete parts a-c for each quadratic function.

a. Find the *y*-intercept, the equation of the axis of symmetry, and the *x*-coordinate of the vertex.
b. Make a table of values that includes the vertex.
c. Use this information to graph the function.

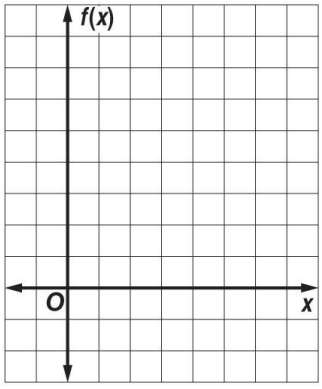
1. $f(x) = -2x^2$



2. $f(x) = x^2 - 4x + 4$



3. $f(x) = x^2 - 6x + 8$



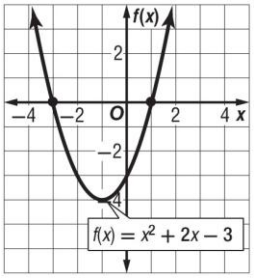
Determine whether each function has a *maximum* or *minimum* value, and find that value. Then state the domain and range of the function.

4. $f(x) = 2x^2 - x + 10$ **5.** $f(x) = x^2 + 4x - 7$ **6.** $f(x) = 3x^2 - 3x + 1$

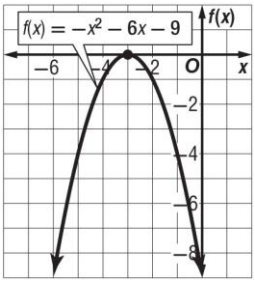
4-2 Solving Quadratic Equations By Graphing

Use the related graph of each equation to determine its solutions.

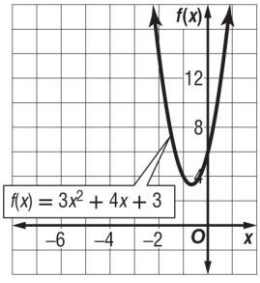
1. $x^2 + 2x - 3 = 0$



2. $-x^2 - 6x - 9 = 0$

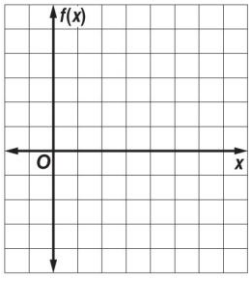


3. $3x^2 + 4x + 3 = 0$

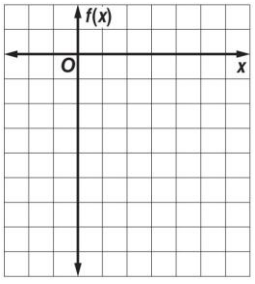


Solve each equation. If exact roots cannot be found, state the consecutive integers between which the roots are located.

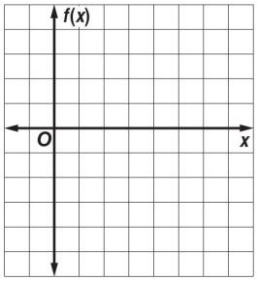
4. $x^2 - 6x + 5 = 0$



5. $-x^2 + 2x - 4 = 0$



6. $x^2 - 6x + 4 = 0$



4-3 Solving Quadratic Equations by Factoring

Write a quadratic equation in standard form with the given root(s).

1. 3, –4 **2.** $-\frac{1}{3}$, 5 **3.** 1, 9

Solve each equation by factoring.

4. $6x^2 - 2x = 0$

5. $x^2 = 7x$

6. $20x^2 = -25x$

7. $x^2 + x - 30 = 0$

8. $2x^2 - x - 3 = 0$

9. $x^2 + 14x + 33 = 0$

4-4 Complex Numbers

Simplify.

1. $\sqrt{-72}$

2. $\sqrt{-24}$

3 . $\sqrt{-12}(\sqrt{-7})$

Solve each equation.

4. $5x^2 + 45 = 0$

5. $4x^2 + 24 = 05$

6. $-9x^2 = 9$

Simplify.

7. $(-4 + 2\boldsymbol{i}) + (6 - 3\boldsymbol{i})$

8. $(5 - \boldsymbol{i}) - (3 - 2\boldsymbol{i})$

9. $(6 - 3\boldsymbol{i}) + (4 - 2\boldsymbol{i})$

10. $(2 + \boldsymbol{i})(3 - \boldsymbol{i})$

11. $(5 - 2\boldsymbol{i})(4 - \boldsymbol{i})$

12. $(4 - 2\boldsymbol{i})(1 - 2\boldsymbol{i})$

13. $\frac{5}{3 + \boldsymbol{i}}$

14. $\frac{7 - 13\boldsymbol{i}}{2\boldsymbol{i}}$

15. $\frac{6 - 5\boldsymbol{i}}{3\boldsymbol{i}}$

4-5 Completing the Square

Solve each equation by using the Square Root Property.

1. $x^2 - 18x + 81 = 49$

2. $x^2 + 20x + 100 = 64$

3. $4x^2 + 4x + 1 = 16$

Find the value of *c* that makes each trinomial a perfect square. Then write the trinomial as a perfect square.

4. $x^2 - 10x + c$ **5.** $x^2 + 60x + c$ **6.** $x^2 - 3x + c$

Solve each equation by completing the square.

7. $y^2 - 4y - 5 = 0$ **8.** $x^2 - 8x - 65 = 0$ **9.** $w^2 - 10w + 21 = 0$

4-6 The Quadratic Formula and the Discriminant

Solve each equation by using the Quadratic Formula.

1. $x^2 + 2x - 35 = 0$ **2.** $x^2 + 10x + 24 = 0$ **3.** $4x^2 - 12x - 63 = 0$

Complete parts a–c for each quadratic equation.

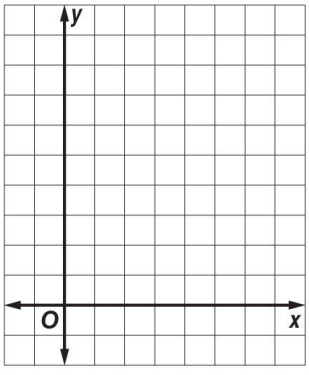
a. Find the value of the discriminant.
b. Describe the number and type of roots.

4. $p^2 + 12p = -4$ **5.** $9x^2 - 6x + 1 = 0$ **6.** $2x^2 - 7x - 4 = 0$

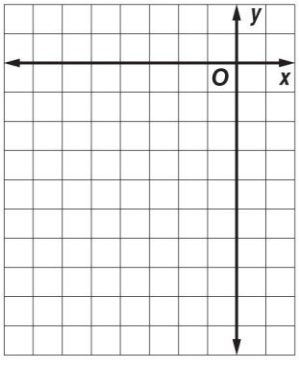
4-7 Transformations of Quadratic Graphs

Write each equation in vertex form. Then graph the function.

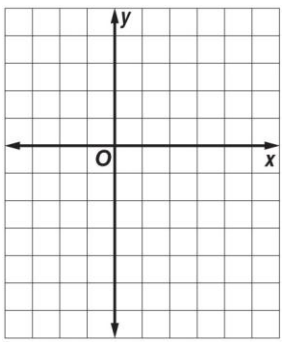
1. $y = x^2 - 10x + 32$



2. $y = x^2 + 6x$



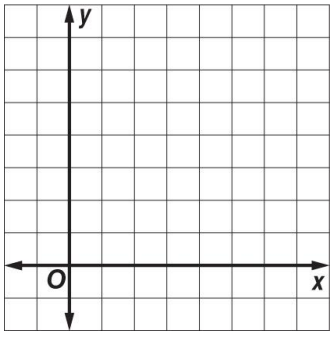
3. $-4x^2 + 16x - 11$



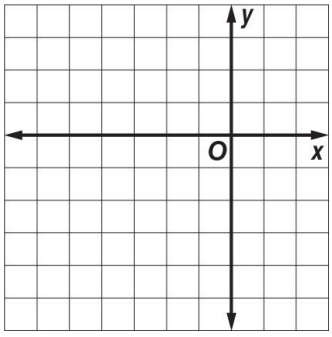
4-8 Quadratic Inequalities

Graph each inequality.

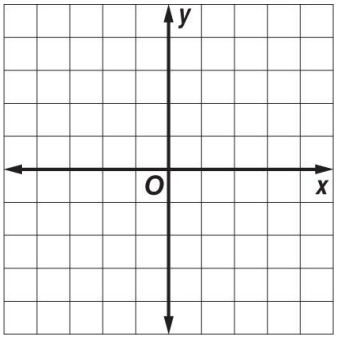
1. $y > x^2 - 8x + 17$



2. $y \leq x^2 + 6x + 4$



3. $y > -2x^2 - 4x + 2$



5-1 Operations with Polynomials

Simplify. Assume that no variable equals 0.

1. $b^4 \cdot b^3$

2. $c^5 \cdot c^2 \cdot c^2$

3. $(2x)^2(4y)^2$

4. $-2gh(g^3h^5)$

5. $10x^2y^3(10xy8)$

6. $\frac{24wz^2}{3w^3z^5}$

7. $\frac{-6a^4bc^8}{36a^7b^2c}$

8. $\frac{-10pt^4r}{-5p^3t^2r}$

9. $(g + 5) + (2g + 7)$

10. $(5d + 5) - (d + 1)$

11. $(x^2 - 3x - 3) + (2x^2 + 7x - 2)$

12. $(-2f^2 - 3f - 5) + (-2f^2 - 3f + 8)$

13. $-5(2c^2 - d^2)$

14. $x^2(2x + 9)$

15. $(a - 5)^2$

16. $(2x - 3)(3x - 5)$

17. $(r - 2t)(r + 2t)$

18. $(3y + 4)(2y - 3)$

19. $(3 - 2b)(3 + 2b)$

20. $(3w + 1)^2$

5-2 Dividing Polynomials

Divide.

1. $\frac{18a^3 + 30a^2}{3a}$

2. $\frac{24mn^6 - 40m^2n^3}{4m^2n^3}$

3. $\frac{60a^2b^3 - 48b^4 + 84a^5b^2}{12ab^2}$

4. $(2x^2 - 5x - 3) \div (x - 3)$

5. $(m^2 - 3m - 7) \div (m + 2)$

6. $(p^3 - 6) \div (p - 1)$

7. $(t^3 - 6t^2 + 1) \div (t + 2)$

8. $(x^5 - 1) \div (2x - 1)$

9. $(2x^3 - 5x^2 + 4x - 4) \div (2x - 2)$

5-3 Polynomial Functions

State the degree and leading coefficient of each polynomial in one variable. If it is not a polynomial in one variable, explain why.

1. $a + 8$

2. $(2x - 1)(4x^2 + 3)$

3. $-5x^5 + 3x^3 - 8$

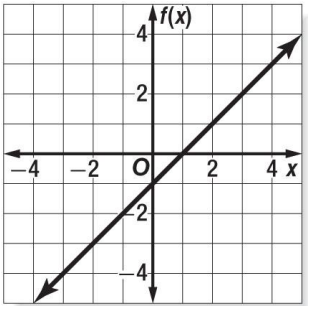
4. $18 - 3y + 5y^2 - y^5 + 7y^6$

5. $u^3 + 4u^2t^2 + t^4$

6. $2r - r^2 + \frac{1}{r^2}$

For each graph,
a. describe the end behavior,
b. determine whether it represents an odd-degree or an even-degree function.
c. determine whether the lead coefficient is positive or negative.
c. state the number of real zeroes.

7.



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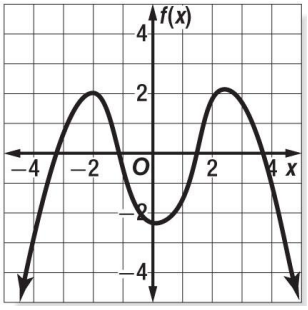

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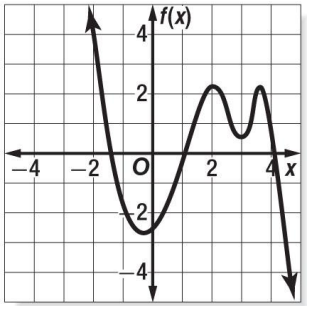


5-5 Solving Polynomial Equations

Factor completely. If the polynomial is not factorable, write *prime*.

1. $14x^2y^2 + 42xy^3$

2. $6mn + 18m - n - 3$

3. $2x^2 + 18x + 16$

4. $x^4 - 1$

5. $35x^3y^4 - 60x^4y$

6. $2r^3 + 250$

7. $100m^8 - 9$

8. $x^2 + x + 1$

9. $c^4 + c^3 - c^2 - c$

Solve each equation using factoring and quadratic techniques.

1. $x^4 = 49$

2. $x^4 - 6x^2 = -8$

3. $x^4 - 3x^2 = 54$

4. $3t^6 - 48t^2 = 0$

5. $m^6 - 16m^3 + 64 = 0$

6. $y^4 - 5y^2 + 4 = 0$

5-6 The Remainder and Factor Theorems

Use synthetic substitution to find $f(2)$ and $f(-1)$ for each function.

1. $f(x) = x^2 + 6x + 5$

2. $f(x) = x^2 - x + 1$

3. $f(x) = x^5 - 7x^3 - 4x + 10$

4. $f(x) = x^6 - 2x^5 + x^4 + x^3 - 9x^2 - 20$

Given a polynomial and one of its factors, find the remaining factors of the polynomial.

5. $x^3 + 2x^2 - x - 2$; $x + 1$

6. $x^3 + x^2 - 5x + 3$; $x - 1$

7. $x^3 + 3x^2 - 4x - 12$; $x + 3$

8. $x^3 - 6x^2 + 11x - 6$; $x - 3$

5-7 Roots and Zeros

State the possible number of positive real zeros, negative real zeros, and imaginary zeros of each function.

1. $f(x) = 4x^3 - 2x^2 + x + 3$

2. $p(x) = 2x^4 - 2x^3 + 2x^2 - x - 1$

3. $q(x) = 3x^4 + x^3 - 3x^2 + 7x + 5$

4. $h(x) = 7x^4 + 3x^3 - 2x^2 - x + 1$

Write a polynomial function of least degree with integral coefficients that has the given zeros.

5. –5, 3***i***

6. –2, 3 + ***i***

7. –1, 4, 3***i***

8. 2, 5, 1 + ***i***

5-8 Rational Zero Theorem

List all of the possible rational zeros of each function.

1. $f(x) = x^3 + 3x^2 - x + 8$

2. $g(x) = 5 - 7x^4 + 3x^2 + x - 20$

3. $h(x) = x^4 - 7x^3 - 4x^2 + x - 49$

4. $p(x) = 2x^4 - 5x^3 + 8x^2 + 3x - 5$

Find ALL of the zeros of each function.

3. $f(x) = x^4 + 2x^3 - 11x^2 + 8x - 60$

4. $f(x) = 4x^4 + 5x^3 + 30x^2 + 45x - 54$

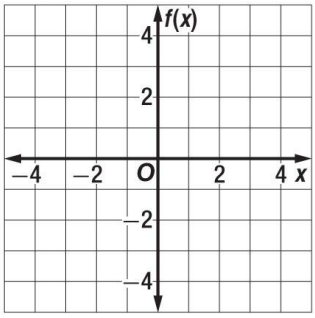
5-4 Analyzing Graphs of Polynomial Functions

Complete each of the following.

a. total number of zeros.
b. y-intercept
c. Number of direction changes.
d. Number of real zeros.
e. Number of imaginary zeros.
f. Find all real zeros.
g. Find the values of any relative minima or relative maxima.
h. Sketch a graph of the function.

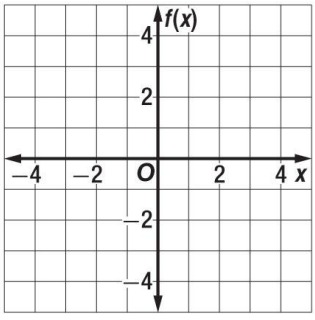
1. $f(x) = x^3 - 3x^2 + 1$

x	$f(x)$
–2	
–1	
0	
1	
2	
3	
4	



2. $f(x) = 2x^3 + 9x^2 + 12x + 2$

x	$f(x)$
–3	
–2	
–1	
0	
1	



3. $f(x) = x^4 - 2x^2 - 2$

x	$f(x)$
–3	
–2	
–1	
0	
1	
2