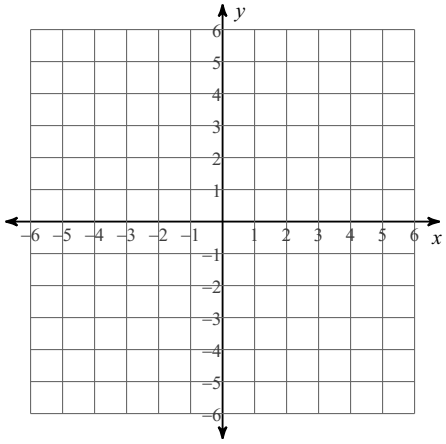
Advanced Algebra Name_____

Semester 1 Final Review

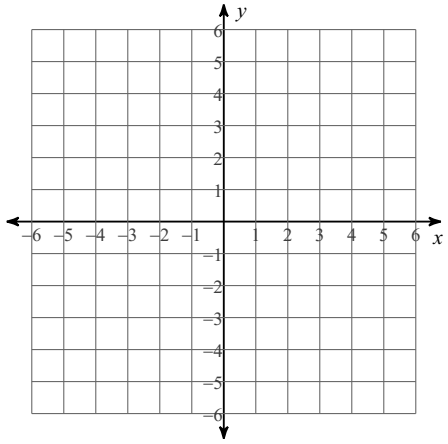
Date_____ Period____

Sketch the graph of each line.

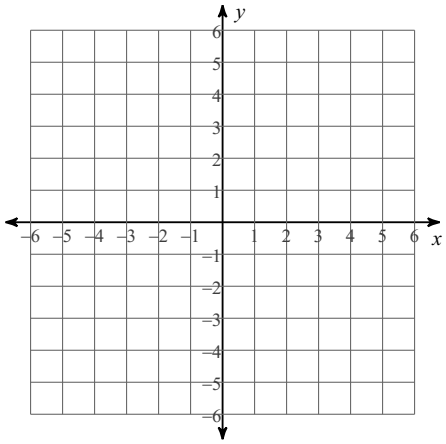
1) $y = -\frac{1}{2}x - 3$



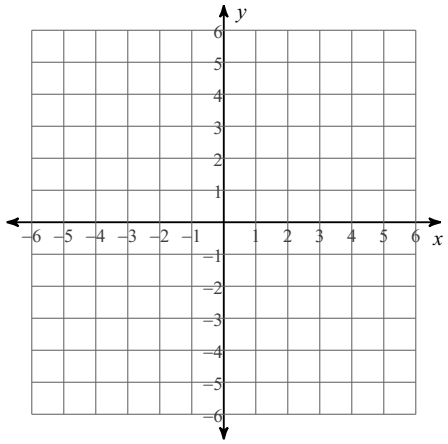
2) $y = \frac{1}{5}x + 2$



3) $3x - 4y = 4$



4) $2x + 5y = 15$



Solve each equation by factoring.

5) $x^2 - 40 = 3x$

6) $8a^2 - 8 = 0$

7) $0 = -108m - 54m^2 - 30$

8) $-80 - 84n = -20n^2$

Solve each equation.

9) $\left|4 + 10r\right| = 34$

10) $\left|4x - 10\right| = 0$

11) $\frac{463}{140} - 2\frac{1}{7}p = -\frac{3}{2}\left(-\frac{2}{5}p - \frac{17}{6}\right) + \frac{9}{5}$

12) $-\frac{2}{3}\left(2k + \frac{37}{8}\right) = -\frac{11}{8}k - \frac{301}{96}$

Solve each equation by completing the square.

13) $r^2 - 12r - 32 = -4$

14) $4k^2 + 8k = 2$

Solve each equation by factoring.

15) $a^2 = 40 + 3a$

16) $x^2 = -5x - 6$

17) $a^2 - 12a = -35$

18) $5b^2 + 5b = 100$

Solve each equation by taking square roots.

19) $4p^2 - 8 = 73$

20) $3m^2 + 7 = 184$

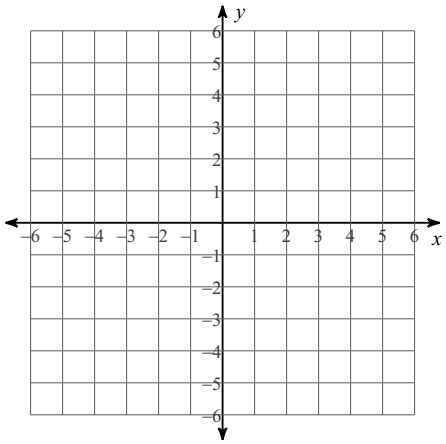
Solve each equation with the quadratic formula.

21) $12b^2 - 3b = -12$

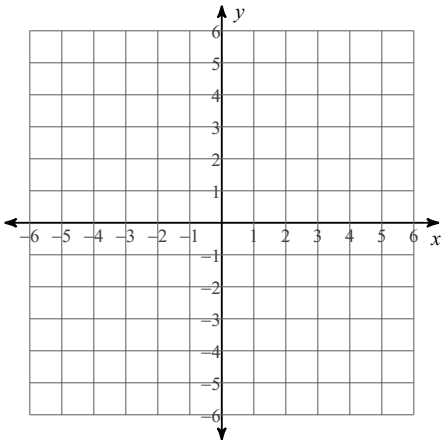
22) $6b^2 - 9b = 81$

Graph each equation.

23) $y = \left|x + 4\right| + 3$

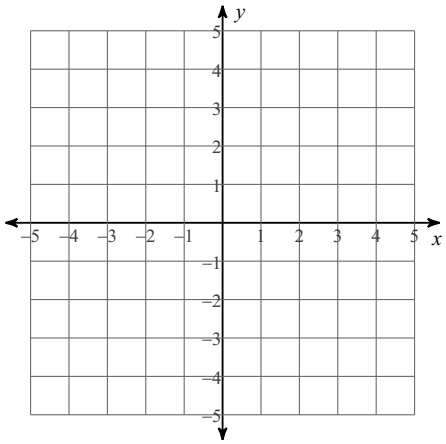


24) $y = -\left|x - 1\right| + 4$

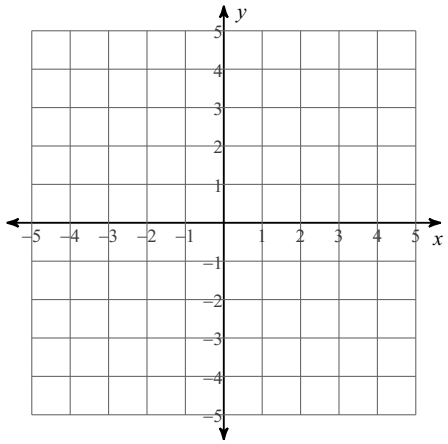


Solve each system by graphing.

25) $x + 2y = 4$
$3x - 2y = 4$



26) $5x - y = 2$
$5x - y = 3$



Write the slope-intercept form of the equation of the line described.

27) through: $(5, -3)$, parallel to $y = -\frac{8}{5}x - 3$

28) through: $(-4, -5)$, parallel to $y = \frac{3}{4}x - 4$

29) through: $(-5, 0)$, perp. to $y = \frac{2}{5}x$

30) through: $(1, 1)$, perp. to $x = 0$

Write the slope-intercept form of the equation of the line through the given points.

31) through: $(0, -2)$ and $(-2, 5)$

32) through: $(3, 1)$ and $(-2, 3)$

Write the slope-intercept form of the equation of the line through the given point with the given slope.

33) through: $(0, 4)$, slope = –3

34) through: $(3, 3)$, slope = 0

Write the slope-intercept form of the equation of each line.

35) $-4y - 10 = 6x$

36) $4y = 5x$

37) $x - y = -7$

38) $3x + y = -5$

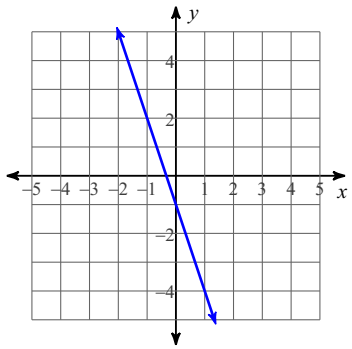
Write the slope-intercept form of the equation of each line given the slope and y-intercept.

39) Slope = $-\frac{1}{3}$, y-intercept = 3

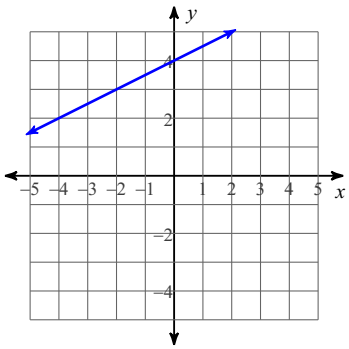
40) Slope = –3, y-intercept = –2

Write the slope-intercept form of the equation of each line.

41)



42)



Solve each system by elimination.

43) $x + y + 4z = 0$
$-5x - y + 4z = -24$
$-2x + y + 6z = -14$

44) $x + 3y = 11$
$-8x - 9y = -28$

Solve each system by substitution.

45) $x - 2y = -12$
$5x + 3y = 18$

46) $-2x + y = 4$
$8x - 5y = -16$

47) When you reverse the digits in a certain two-digit number you increase its value by 54. Find the number if the sum of its digits is 12.

48) Mei and Sarawong are selling cheesecakes for a school fundraiser. Customers can buy pecan cheesecakes and strawberry cheesecakes. Mei sold 9 pecan cheesecakes and 6 strawberry cheesecakes for a total of $165. Sarawong sold 10 pecan cheesecakes and 12 strawberry cheesecakes for a total of $258. What is the cost each of one pecan cheesecake and one strawberry cheesecake?

49) Natalie's school is selling tickets to a spring musical. On the first day of ticket sales the school sold 4 adult tickets and 3 child tickets for a total of $46. The school took in $117 on the second day by selling 9 adult tickets and 9 child tickets. Find the price of an adult ticket and the price of a child ticket.

Simplify. Write "undefined" for expressions that are undefined.

50) $\begin{bmatrix} -4 & -6 & -3 \\ -3 & 6 & -3 \end{bmatrix} \cdot \begin{bmatrix} 0 & 5 & -6 \\ 2 & -4 & -6 \end{bmatrix}$

51) $\begin{bmatrix} 4 \\ -2 \\ -3 \end{bmatrix} \cdot \begin{bmatrix} -2 & 2 \end{bmatrix}$

52) $\begin{bmatrix} -6 & -5 \\ -2 & -3 \end{bmatrix} - \begin{bmatrix} 0 & 2 \\ 2 & 6 \end{bmatrix}$

53) $\begin{bmatrix} -3 & -2 & 4 & -2 \end{bmatrix} + \begin{bmatrix} -5 & 6 & -3 & 6 \end{bmatrix}$

Evaluate the determinant of each matrix.

54) $\begin{bmatrix} -3 & -2 \\ 5 & 1 \end{bmatrix}$

55) $\begin{bmatrix} -1 & 1 \\ -3 & 5 \end{bmatrix}$

Simplify. Write "undefined" for expressions that are undefined.

56) $\begin{bmatrix} 1 & -4 & 5 \end{bmatrix} + \begin{bmatrix} -2 & -4 & -3 \end{bmatrix}$

57) $\begin{bmatrix} -2 & 2 & 0 & -6 \\ 4 & -2 & 0 & -1 \end{bmatrix} \cdot \begin{bmatrix} 1 & 5 & -1 \\ -5 & -1 & -5 \end{bmatrix}$

58) $\begin{bmatrix} 2 & 6 & -6 & 5 \\ -6 & 5 & 5 & 6 \end{bmatrix} - \begin{bmatrix} 1 & 5 & 6 & -3 \\ 6 & -3 & 5 & -4 \end{bmatrix}$

59) $3\begin{bmatrix} -5 & 0 & -6 \\ 3 & 6 & 2 \end{bmatrix}$

Simplify.

60) $\dfrac{8}{9 + 10\sqrt{10}}$

61) $\dfrac{\sqrt{10}}{10\sqrt{3} + \sqrt{2}}$

62) $\dfrac{3i}{-1 - 2i}$

63) $\dfrac{4}{2 + 7i}$

64) $(-8i) + (-8 + 3i) + (7i)$

65) $(-2 - 2i) + (-3 - i)$

66) $(-3 - 2i)^2$

67) $(-6 + 6i)^2$

Simplify each expression.

68) $\dfrac{\dfrac{16}{x}}{\dfrac{1}{x} - \dfrac{x}{4}}$

69) $\dfrac{25}{\dfrac{u}{25} + \dfrac{1}{2}}$

Evaluate each function.

70) $g(n) = n^2 - 4n$; Find $g(-2)$

71) $p(t) = -\left|-2t\right| + 1$; Find $p(-6)$

72) $p(x) = 2x^2 - 2$; Find $p(4)$

73) $f(n) = -2\left|-n - 1\right|$; Find $f(-2)$

Find the discriminant of each quadratic equation then state the number and type of solutions.

74) $3b^2 - 5b + 7 = 0$

75) $4p^2 - 4p + 1 = 0$

76) $8b^2 + 7b = 0$

77) $-b^2 + 7b - 6 = 0$

Simplify.

78) $\sqrt{810}$

79) $\sqrt{45}$

80) $\sqrt{360}$

81) $\sqrt{175}$

Factor each completely.

82) $25v^2 - 64$

83) $r^2 + 16r + 64$

Find all roots.

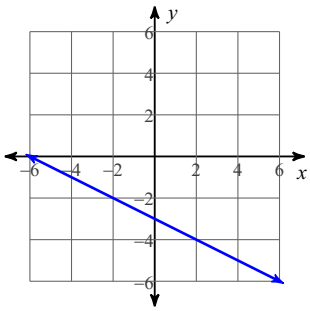
84) $(5x - 3)(x - 4) = 0$

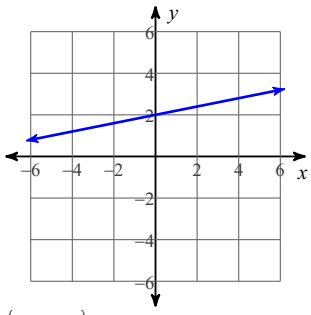
85) $(2x + 5)(x + 4) = 0$

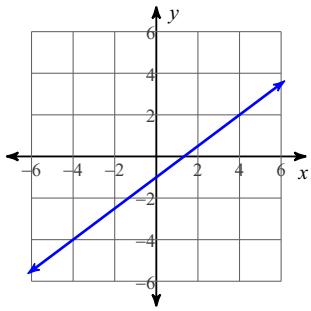
86) $3x^2 + 11x - 4 = 0$

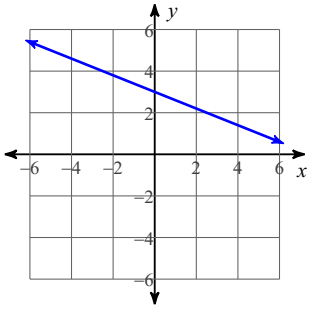
87) $5x^2 + 2x - 3 = 0$

Answers to Semester 1 Final Review

1) 

2) 

3) 

4) 

5) $\{-5, 8\}$

6) $\{1, -1\}$

7) $\left\{-\frac{1}{3}, -\frac{5}{3}\right\}$

8) $\left\{-\frac{4}{5}, 5\right\}$

9) $\left\{3, -\frac{19}{5}\right\}$

10) $\left\{\frac{5}{2}\right\}$

11) $\{-1\}$

12) $\left\{-\frac{5}{4}\right\}$

13) $\{14, -2\}$

14) $\left\{\frac{-2+\sqrt{6}}{2}, \frac{-2-\sqrt{6}}{2}\right\}$

15) $\{8, -5\}$

16) $\{-3, -2\}$

17) $\{7, 5\}$

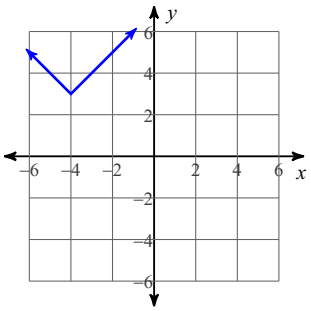
18) $\{-5, 4\}$

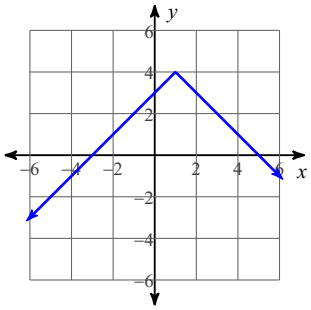
19) $\left\{\frac{9}{2}, -\frac{9}{2}\right\}$

20) $\{\sqrt{59}, -\sqrt{59}\}$

21) $\left\{\frac{1+3i\sqrt{7}}{8}, \frac{1-3i\sqrt{7}}{8}\right\}$

22) $\left\{\frac{9}{2}, -3\right\}$

23) 

24) 

25) $(2, 1)$

26) No solution

27) $y = -\frac{8}{5}x + 5$

28) $y = \frac{3}{4}x - 2$

29) $y = -\frac{5}{2}x - \frac{25}{2}$

30) $y = 1$

31) $y = -\frac{7}{2}x - 2$

32) $y = -\frac{2}{5}x + \frac{11}{5}$

33) $y = -3x + 4$

34) $y = 3$

35) $y = -\frac{3}{2}x - \frac{5}{2}$

36) $y = \frac{5}{4}x$

37) $y = x + 7$

38) $y = -3x - 5$

39) $y = -\frac{1}{3}x + 3$

40) $y = -3x - 2$

41) $y = -3x - 1$

42) $y = \frac{1}{2}x + 4$

43) $(4, 0, -1)$

44) $(-1, 4)$

45) $(0, 6)$

46) $(-2, 0)$

47) 39

48) pecan cheesecake: \$9, strawberry cheesecake: \$14

49) adult ticket: \$7, child ticket: \$6

50) Undefined

51) $\begin{bmatrix} -8 & 8 \\ 4 & -4 \\ 6 & -6 \end{bmatrix}$

52) $\begin{bmatrix} -6 & -7 \\ -4 & -9 \end{bmatrix}$

53) $\begin{bmatrix} -8 & 4 & 1 & 4 \end{bmatrix}$

54) 7

55) −2

56) $\begin{bmatrix} -1 & -8 & 2 \end{bmatrix}$

57) Undefined

58) $\begin{bmatrix} 1 & 1 & -12 & 8 \\ -12 & 8 & 0 & 10 \end{bmatrix}$

59) $\begin{bmatrix} -15 & 0 & -18 \\ 9 & 18 & 6 \end{bmatrix}$

60) $\frac{-72 + 80\sqrt{10}}{919}$

61) $\frac{5\sqrt{30} - \sqrt{5}}{149}$

62) $\frac{-3i - 6}{5}$

63) $\frac{8 - 28i}{53}$

64) $-8 + 2i$

65) $-5 - 3i$

66) $5 + 12i$

67) $-72i$

68) $\frac{64}{4 - x^2}$

69) $\frac{1250}{2u + 25}$

70) 12

71) −11

72) 30

73) −2

74) −59; two imaginary solutions

75) 0; one real solution

76) 49; two real solutions

77) 25; two real solutions

78) $9\sqrt{10}$

79) $3\sqrt{5}$

80) $6\sqrt{10}$

81) $5\sqrt{7}$

82) $(5v + 8)(5v - 8)$

83) $(r + 8)^2$

84) $\left\{\frac{3}{5}, 4\right\}$

85) $\left\{-\frac{5}{2}, -4\right\}$

86) $\left\{\frac{1}{3}, -4\right\}$

87) $\left\{\frac{3}{5}, -1\right\}$