Lecture 1 Answers

1. $\frac{1}{21}$

2. $\frac{1}{20}$

3. $\frac{1}{2}$

4. $\frac{19}{10}$

5. $\frac{7}{4}$

6. $\frac{39}{175}$

7. $\frac{25}{77}$

8. DNE

9. $5a + 55$

10. $6 \cdot 9^8$

11. -16 , 16

12.
   whole number
   integer
   rational number
   real number

13.
   irrational number
   real number

14.
   11

   $11, -5, 0$

   $11, -5, 0, -\frac{13}{4}, 5.75$

   $\sqrt{11}, \pi$

   $11, -5, 0, -\frac{13}{4}, 5.75, \sqrt{11}, \pi$

15. 0.7

16. 0.7

17. 0.9

18. 0.72

19. Expression

20. Equation

21. $-\frac{1}{4}$

22. 13 $\frac{2}{3}$ 0

23. $-x + 10$ $7x - 9$

24. $[4,19)$ $[5, \infty)$

Lecture 2 Answers

1. z^{25}
2. $\dfrac{1}{z^5}$
3. $33 \cdot z^8$
4. $\dfrac{10}{9d}$
5. $4 \cdot x^1 \cdot y^5$
6. a. 9,-9   b. 9
7. -10
8. DNE
9. $\dfrac{3}{10}$
10. 5
11. 3
12. $6\sqrt{5}$
13. x^4
14. $k^{10}\sqrt[3]{k^2}$
15. $2\sqrt{3a}$
16. $\sqrt{175x^8y^{11}}$ can be simplified as $5x^4y^5\sqrt{7y}$
17. $-2y^{11}$
18. $\dfrac{5c^7}{2b^4}$
19. $2xy\sqrt[3]{2xy^2}$
20. $4\sqrt[3]{2}$
21. $-5\sqrt{10}$
22. These are not like terms and cannot be combined
23. $-6\sqrt[3]{3}$
24. $20\sqrt{6} \sim 49.0 \sim 144$
25. $105\sqrt{3}$
26. $\dfrac{4\sqrt{2}}{5k^3n}$
27. $2\sqrt{15} \sim 15$
28. $\sqrt{6} \sim 6$
29. $-4\sqrt{2}$

30. $\dfrac{\sqrt{165}}{11}$

31. $\dfrac{\sqrt{5x}}{x^2}$

32. $\dfrac{15\sqrt{x}}{x}$

33. $9 \sim 14$

34. $\sqrt[4]{x}$

35. $\dfrac{1}{256}$

36. $\dfrac{1}{\sqrt[10]{x^7}}$

37. 625

38. $8^{\frac{7}{8}}$

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Lecture 3 Answers

1. $-3x^2 + x - 6$
2. $6x^6 - 15x^5$
3. $4x^4 + x^3 + 9x + 10$
4. $8x^2 + 2x - 2$
5. $2 \cdot x^2 - 12 \cdot x + 10$
6. $49 \cdot x^2 - 70 \cdot x + 25$
7. $18 \cdot r^3 - 84 \cdot r^2 - 144 \cdot r$
8. $-3(2x^8 + x^5 + 3)$
9. $2x^6(7x^3 + 3x^2 + 11)$
10. $(x + 1)(x - 3)$
11. $(z + 8)(z + 9)$
12. $(w^2 + 10)(w - 3)$
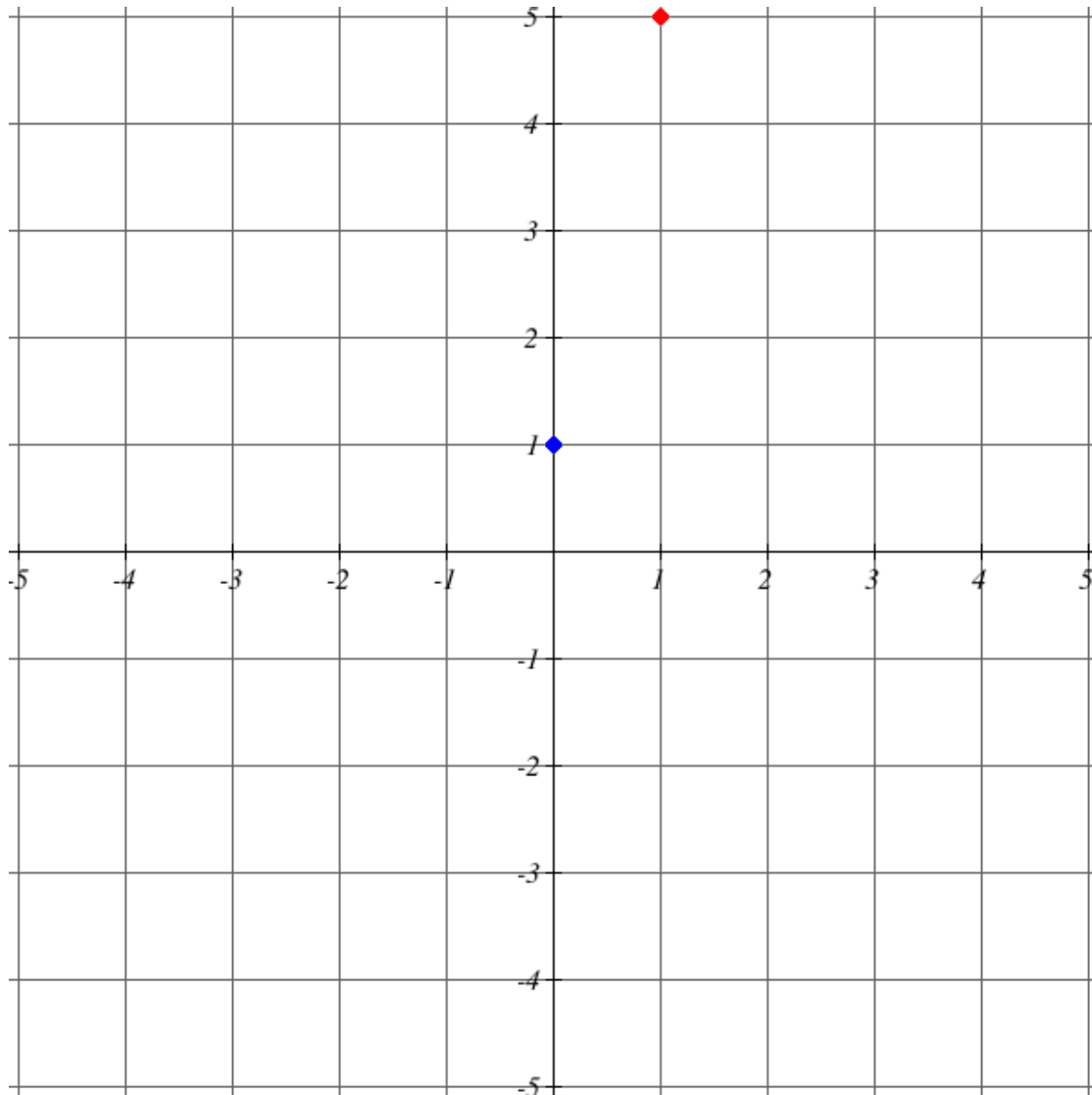13. $(y + 4)(y - 2)$
14. $(6z - 5)(z + 7)$
15.
    Hint: You first need to take out the greatest common factor of $2w$. Then, you can factor as $2w(w + 5)(w - 9)$.
16. $-\frac{10}{3}, -\frac{7}{5}$
17. 0,8
18. 5,-5
19. $-\frac{2}{9}, -10$
20. $x(x + 2) = 99$, 9,11 , -11,-9
21. 5,-5,4
22. $-4\sqrt{11}, 4\sqrt{11}$, DNE
23. $-2 + 2\sqrt{6}, -2 - 2\sqrt{6}$
24. $ax^2 + bx + c = 0$
25. $1, -\frac{5}{2}$
26. $\frac{5+\sqrt{37}}{6}, \frac{5-\sqrt{37}}{6}$
27. 81 , $(x + 9)^2$
28. 9 , 9
29. $(x + 9)^2 = 4$, -7,-11
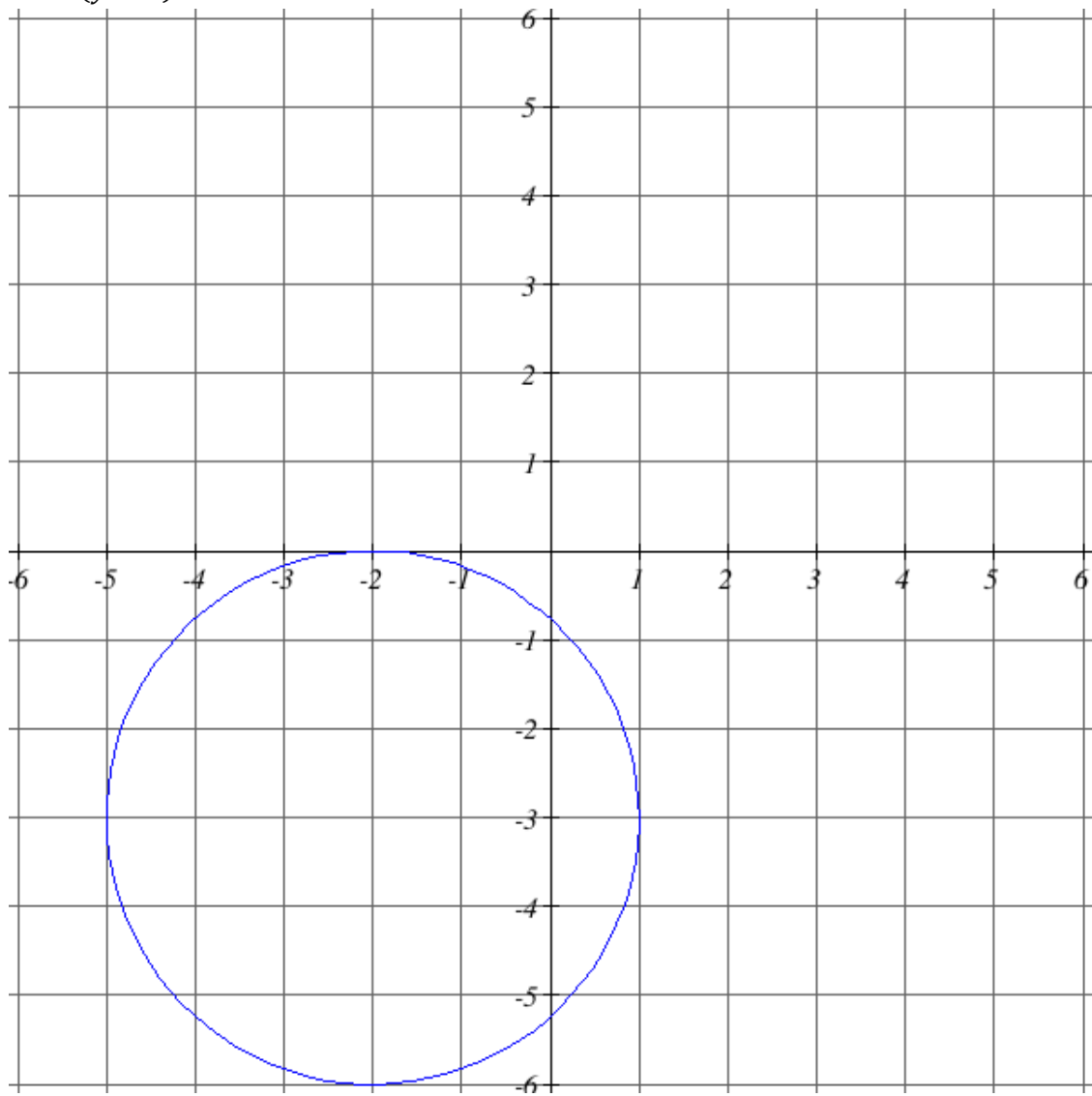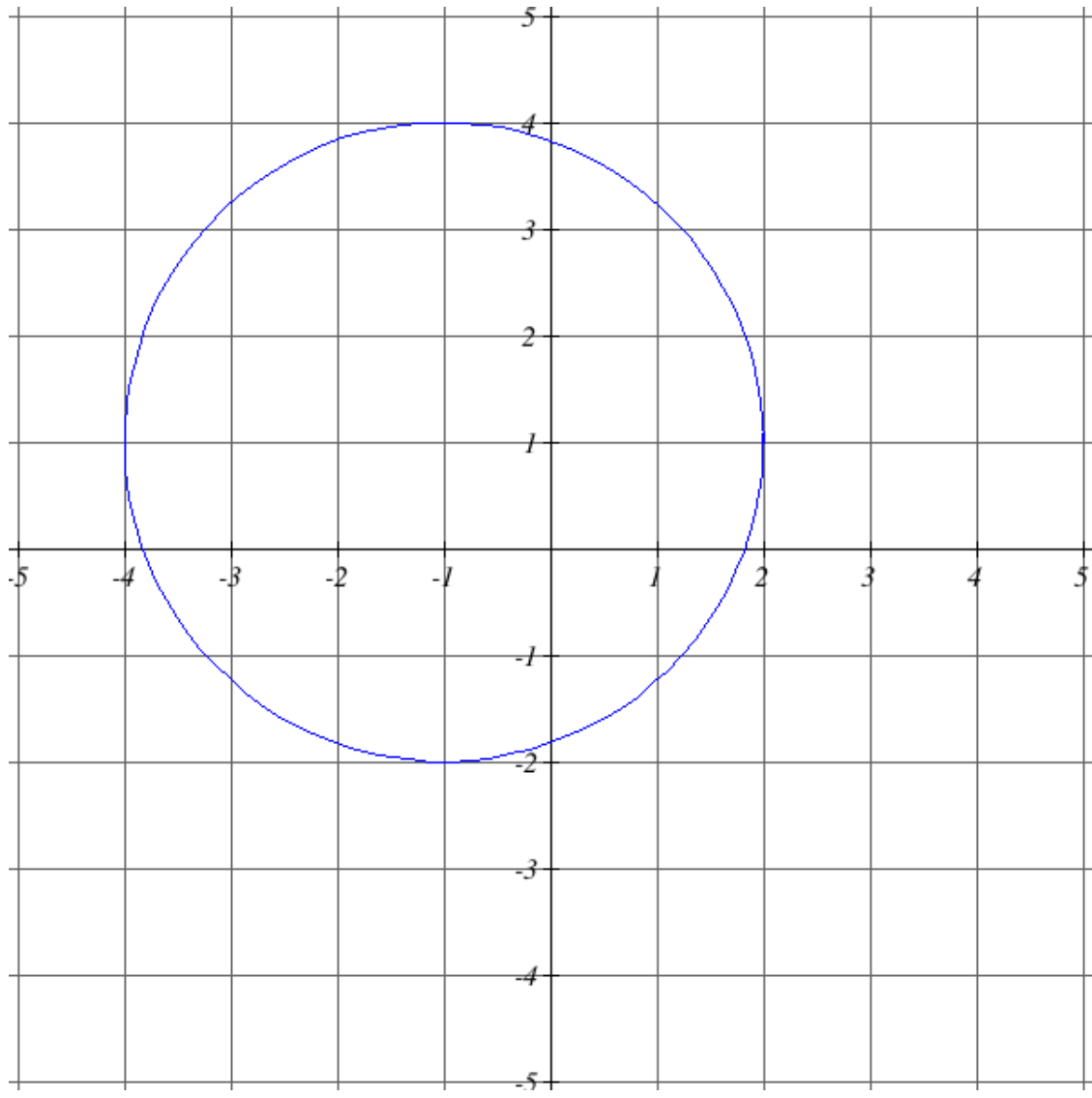30. $\frac{9}{2}, -3$

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Lecture 4 Answers
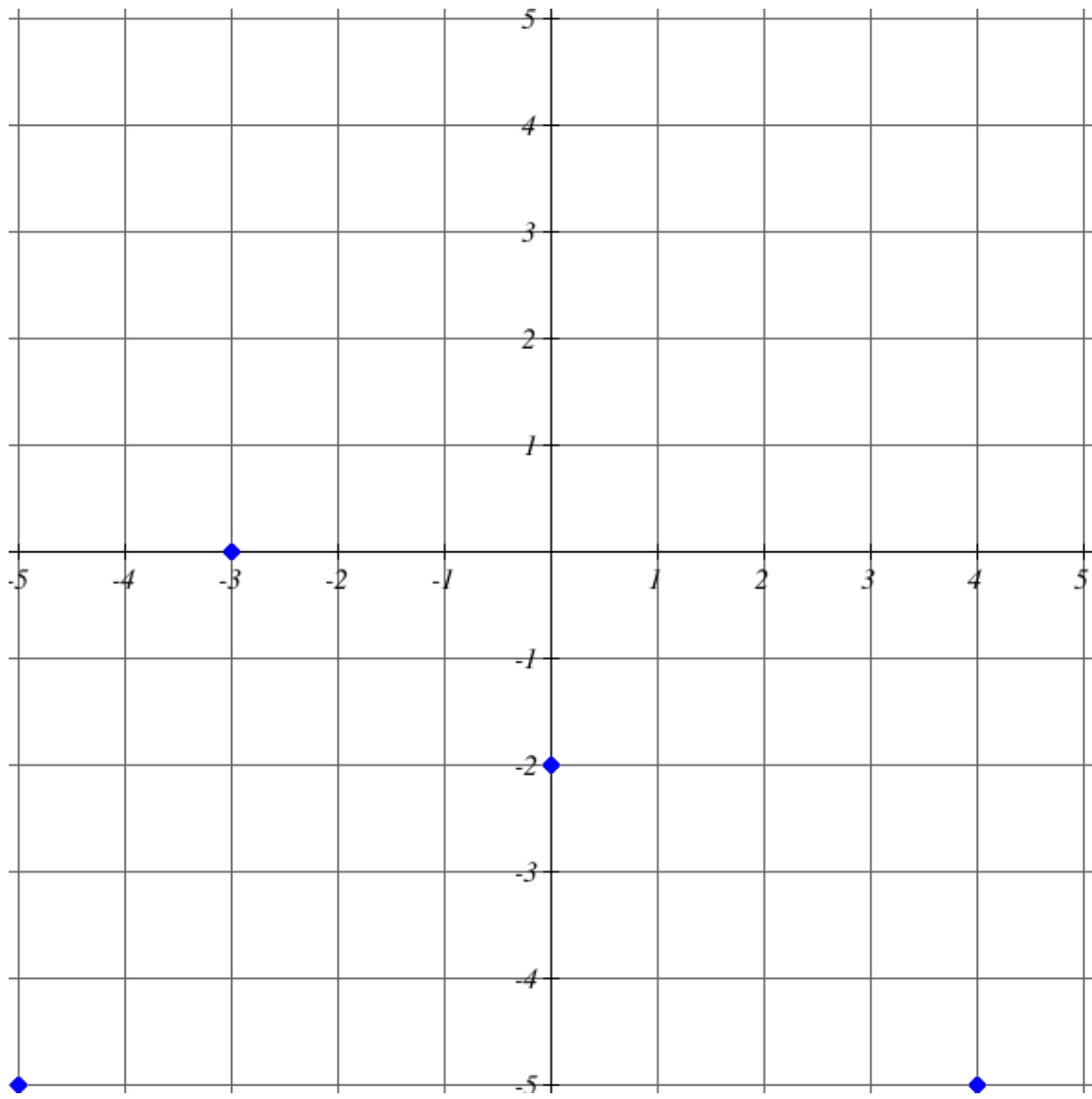
1.

2.

3. Quadrant II , Y-Axis , X-Axis , Y-Axis , Quadrant III , Quadrant IV

4. (0.5,1)

5. $\left(0, -\frac{5}{8}\right)$

6. 5

7. $\sqrt{34}$

8. $\sqrt{20}$

9. $10\sqrt{5}$

10. $3\sqrt{137}$

11. $x^2 + (y - 8)^2 = 12^2$

12. -1 , -9 , $\sqrt{26}$

13. 0.5 , -3 , $\frac{\sqrt{117}}{2}$
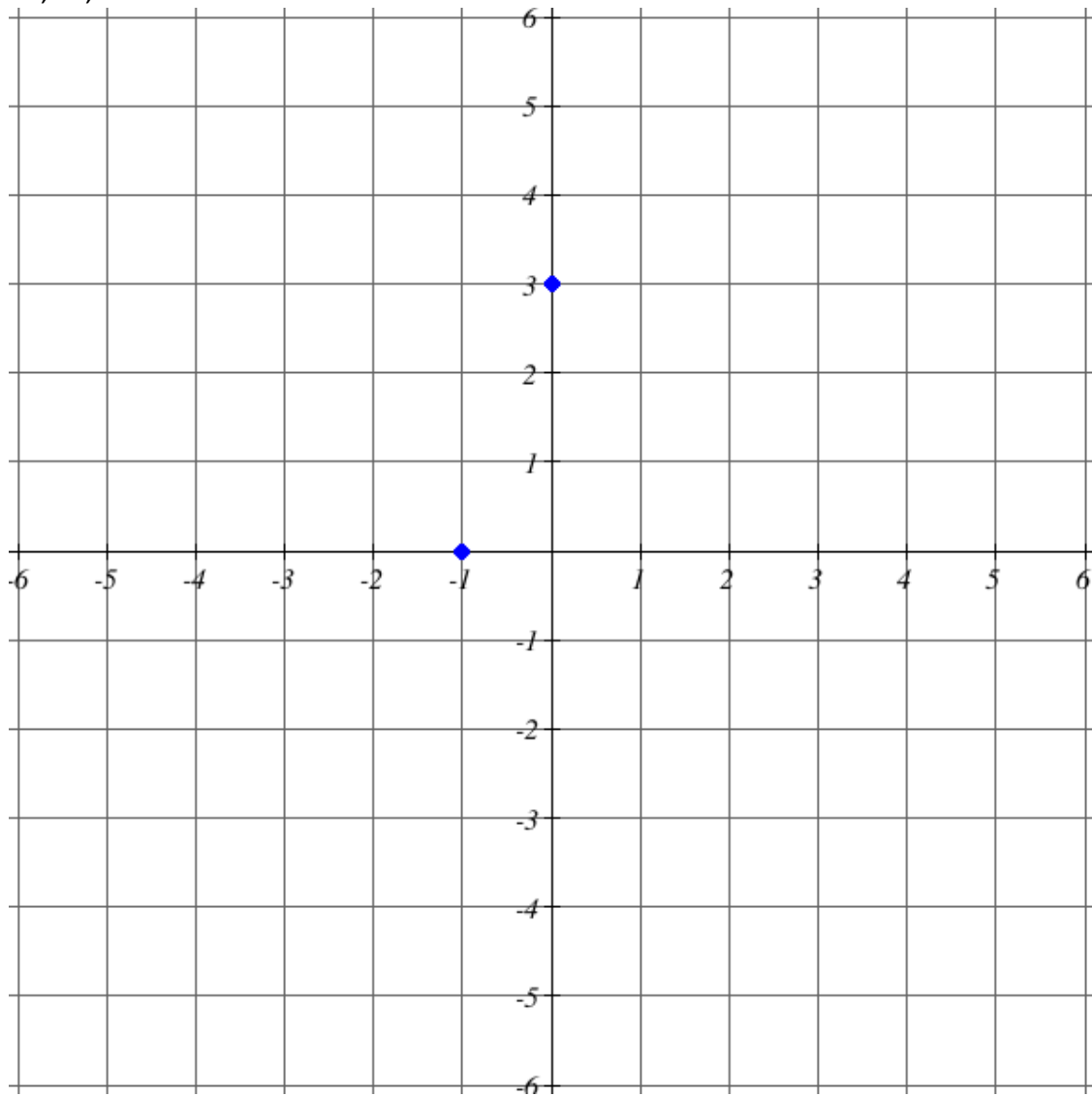
14. $(x + 3)^2 + (y - 4)^2 = 9$

15. $x^2 + (y-4)^2 = 9$

16.

17.

18. -1 , 3 ,

19. $(7,0), (-4,0)$
20. $(0, -10), (0,5)$
21. $\left(-\frac{1}{6}, 0\right)$
22. $(0, -4)$
23. $(12, -2)$
24. $(8, -3)$
25. $(-7,9)$
26.

symmetry about the origin

27.

symmetry about the x -axis

28.

symmetry about the y -axis

29.

    symmetry about the x -axis

    symmetry about the y -axis

    symmetry about the origin

30.

    no symmetry

31. -2 , -1 , 0 , -1 , -2 ,

32. -0 , -1 , $-\sqrt{2}$

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Lecture 5 Answers

1. 10,-21,-14,24 , -18,-21,19,-29
2. 1,-4,-1,-3,4 , -5,5,0,2,-3
3. -18,-20,7,-3,-7 , 12,-18,-9,16,-8 , Yes
4. 6
5. oo
6. $-4 < x \le 1$, $-4 < y \le 5$
7. -2 , 2 , 0 , 2
8. All real numbers , $y \ge 2$
9. $x \le 1$, $y \ge 3$
10. $-6 \le x \le 0$, $-2 \le y \le 1$
11. 0
12. $\frac{27}{5}$
13. All real numbers
14. $(-7, -8)$
15. 39 , 15 , 3 , 3 , 15
16. There are an infinite number of possible correct answers based on the inputs you choose. Here is one: $g(1) = 4, (1,4)$
17. $(x - 17)^2$
18. $-\frac{14}{17}$
19. -6 , 9
20. -79 , 5,1
21. There are an infinite number of possible correct answers based on how you construct the function. Here is one:
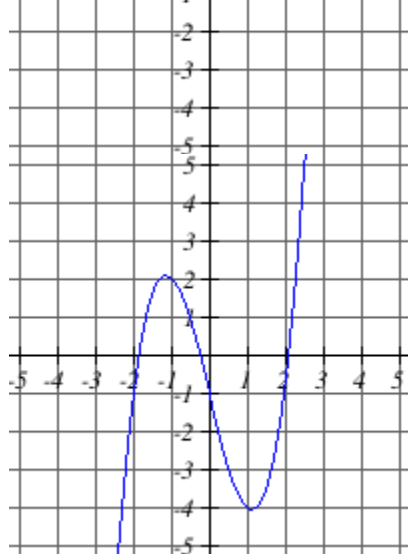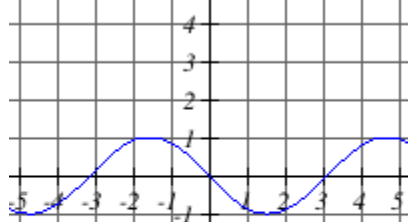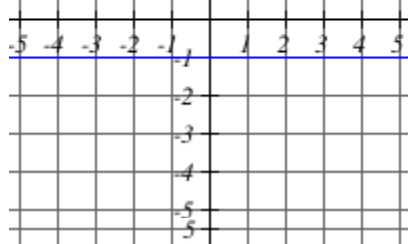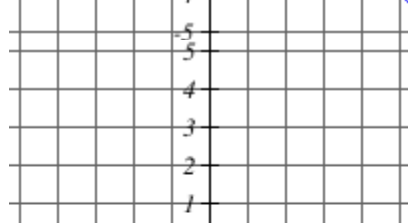
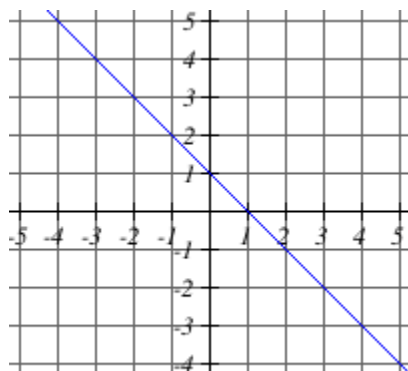| x	-8	-5	2	3
$f(x)$	4	7	10	0

22. There are an infinite number of possible correct answers based on the function you create. Here is one: $f(x) = x^2 - 6$
23. -3
24. 1
25. 4 , -2
26. $11 \cdot x - 20$
27. 8 is added to n and the result is squared
28. x is squared and 5 is added to the result
29. 85.5 , $T(29)$ is the estimated high temperature on April 30

30. $f(45) = 5$
31. $f(x) = 5x + 7$
32.

33.

x	y
-2	-4
3	2
6	5
7	8
14	15

x	y
0	-1
1	2
4	2
8	9
11	10

34. 78 , 1

35. -66 , -48

36. {x | x ≠ -10 and x ≠ 1}

37. [-5,3]

38. -1 , 2 , 6

39. [-5,-3] , (-3,2] , (2,6]

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Lecture 6 Answers
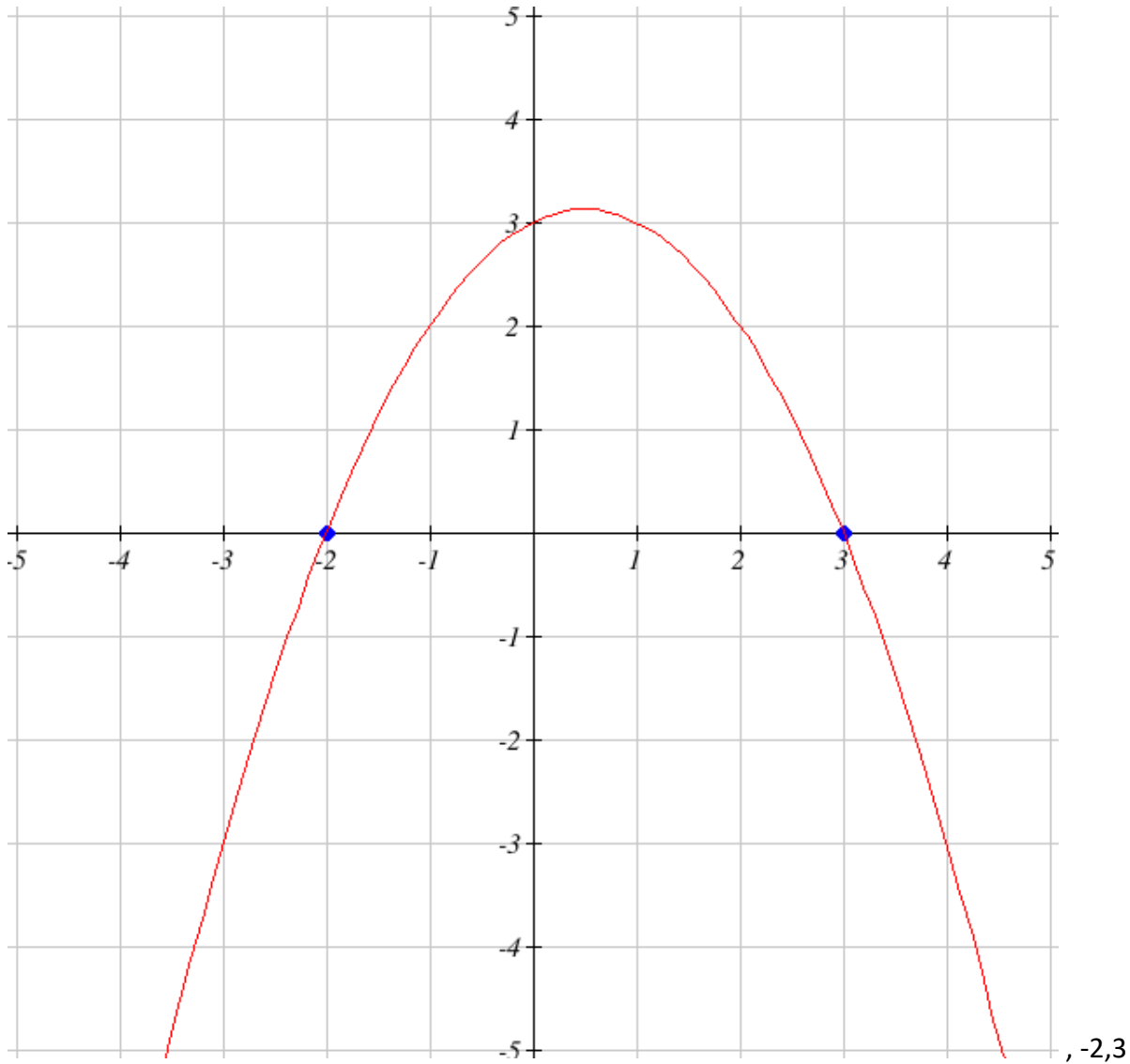
1. , -2,3
2. $(-2,0), (4,0)$, -2,4
3. $-2,1,2$, $(-2,1) \cup (2,\infty)$, $(-\infty,-2) \cup (1,2)$
4. $-3,-2,1$, $(-\infty,-3) \cup (-2,1)$, $(-3,-2) \cup (1,\infty)$
5. -3 , $(-\infty,-3) \cup (-3,\infty)$, DNE
6. $\frac{339-297}{2000-1999} = 42$, $\frac{339-297}{2006-1999} = 6$
7. -0.43301270189222
8. -14
9. $4t + 20$
10. $(-2.5,1)$, $(-\infty,-2.5) \cup (1,\infty)$
11. minimum , -2 , 2 , $(2,\infty)$, $(-\infty,2)$
12. -1 , 2.5
13. $(0,1) \cup (6,\infty)$
14. $(-\infty,-3)$, $(3,\infty)$, $(-3,3)$, $(-\infty,\infty)$, $(-\infty,3]$
15. 0 , -7 , -8 , 1 , $(-\infty,-7) \cup (1,\infty)$, $(-7,1)$, $(-\infty,\infty)$, $(-\infty,\infty)$

16. $(0,4)$, $(3,-5)$
17. $(-3,-2.25), (-0.5, 0.35416666666667)$
18. 7 , 3 , 4 , 0 , $(0,3)$, $(-\infty, 0) \cup (3, \infty)$, $(-\infty, \infty)$, $(-\infty, \infty)$
19. minimum , -4 , -1 , $(-1, \infty)$, $(-\infty, -1)$, $(-\infty, \infty)$, $[-4, \infty)$
20. Decreasing , Concave up
21. (-oo,3) , (3,oo) , $(3, -2)$
22. (-oo,-1) , (-1,oo) , $(-1, 4)$
23. $-2, 0$
24. $1, 3$
25. $-2, 0$
26. DNE , $(-\infty, \infty)$, DNE , $(-\infty, \infty)$, DNE , $(-\infty, \infty)$, DNE
27. DNE , $(-\infty, \infty)$, DNE , DNE , $(-\infty, \infty)$, $(-\infty, \infty)$, DNE

28 – 34. Answers are not unique. There are an infinite number of possible correct answers.

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Lecture 7 Answers

1. 0 , 27 , 36 , 2
2. 36 , 44 , -160 , -10
3. $f(2) = -4$, $f(4) = -1$, $g(3) = -1$, $g(4) = 9$, $(f - g)(-1) = -6$, $(f - g)(2) = -5$, $(f + g)(1) = -5$, $(f + g)(3) = -6$
4. False
5. $2 \cdot x^2 + 4 \cdot x + 4$
6. $6x^3 + 12x^2 + 6x$
7. 2 , 0 , 2 , 4 , -2 , 6 , 4 , 2 , -2 , 0 , 2 , 0
8. 4 , 4 , 3 , -2
9. $x^2 + 3x - 28$, $x^2 + 1x - 20$, $x^3 - 2x^2 - 32x + 96$, $x + 6$
10. False
11. True
12. $x + 5$, 4
13. $x \neq -5,8$
14. 9 , 7 , 8 , 1
15. $(f \circ g)(-5) = -10$, $(g \circ f)(-10) = 12$, $(f \circ f)(-3) = -3$, $(g \circ g)(12) = 6$
16. 0 , 1 , 3 , 2
17. 10 , 30 , 8 , 7
18. Evaluate $C\big(D(7)\big)$
19. 10 , -55
20. $-48x - 11$, $-48x + 17$, $64x - 27$, $36x + 5$
21. $-50x^2 + 145x - 102$, $10x^2 + 25x + 6$, $-8x^4 - 40x^3 - 40x^2 + 25x$, $25x - 24$
22. $-32x^2 - 116x - 93$, $-8x^2 - 20x + 42$
23. $9x^2 + 6x + 3$
24. $x^4 + 10x^3 + 30x^2 + 25x$
25. $(0,2)U(2, \infty)$, $(-\infty, -2)U(2, \infty)$, $(0, \infty)$
26. $x^2 + 2xh + h^2 + 4x + 4h + 5$, $2xh + h^2 + 4h$
27. $64x + 63$
28. $\left(\sqrt{x} - 2\right)^4 + 2$
29. $\left(\sqrt{x} - 3\right)^4 + 8$
30. $x + 8$
31. $\dfrac{1}{x}$
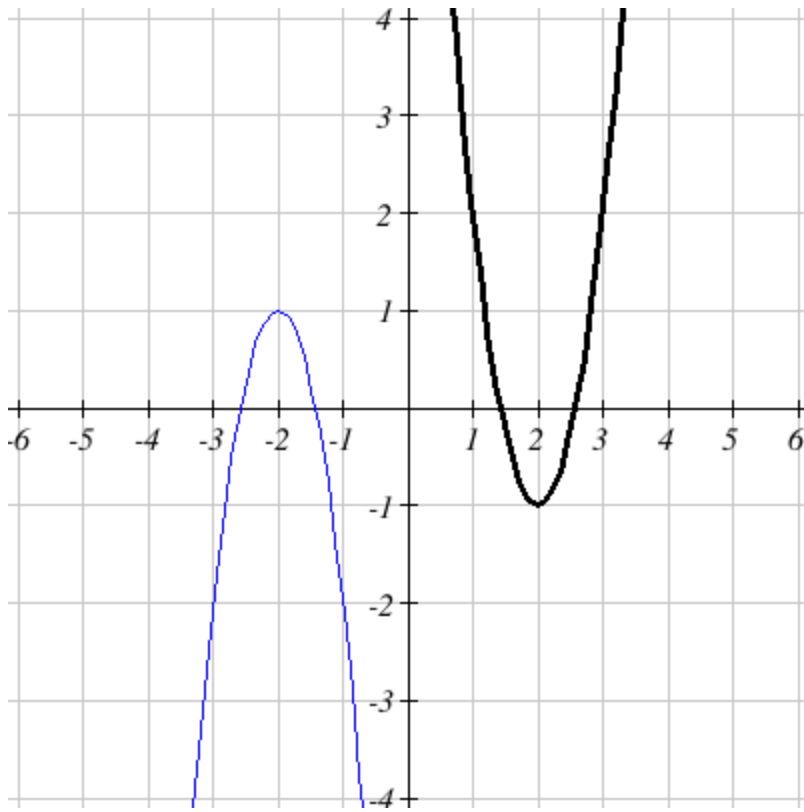32. There are many possible correct answers

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Lecture 8 Answers

1. c d e a b
2. f c b d a e
3. 6 , -8
4. shifting the graph of $f(x)$ to the left 98 units
5. $4 \cdot \sqrt{x-3} + 6$
6. $f(x-1)$, $f(x) - 1$
7. $f(x) - 1$
8. $x^3 + 4$
9. $(x+2)^4$
10. $3 \cdot \sqrt{x-5} + 6$
11. $(x-95)^2 + 32$
12. $x^2 + \frac{7}{3}x - 1$
13. $15x^2 - 3x - 30$
14. $4x^2 + 2x - 1$
15. $-2x^2 + 4x + 4$
16. $4^x + 6$, 4^{x-9} , 4^{-x}
17. horizontally stretching the graph of $f(x)$ by a factor 8
18. 9 , -2 , 2
19. $-\sqrt{x}$, $\sqrt{-x}$
20. a c b
21. $-(x+2)^2 - 3$
22. $-|x+1| + 2$
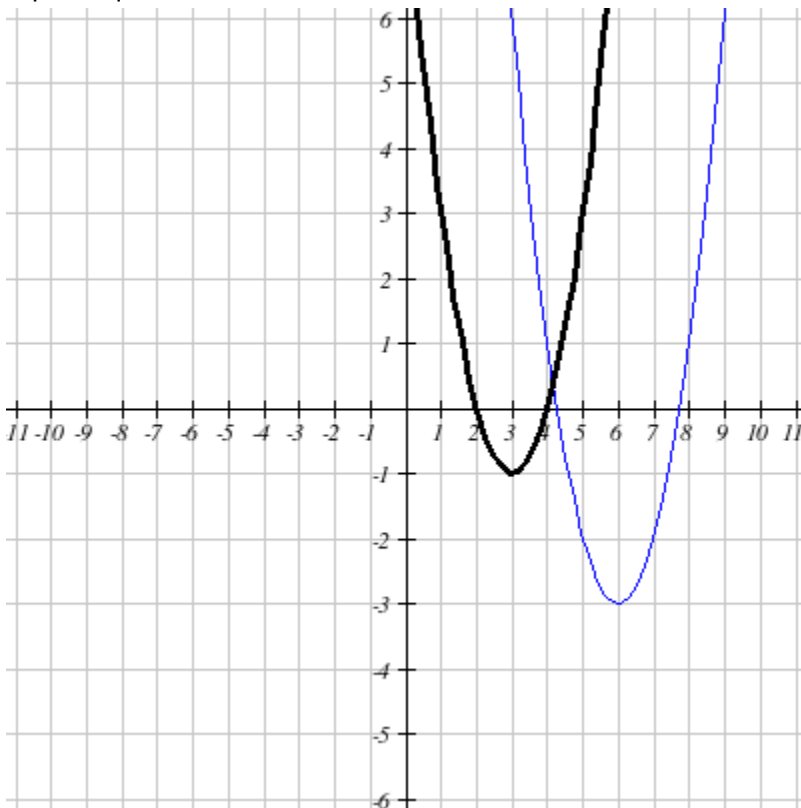
23.

, $(6, -3)$, $(x-6)^2 - 3$

24. $, (-2,1) , -3 \cdot (x+2)^2 + 1$

25. $|x - 3| - 3$
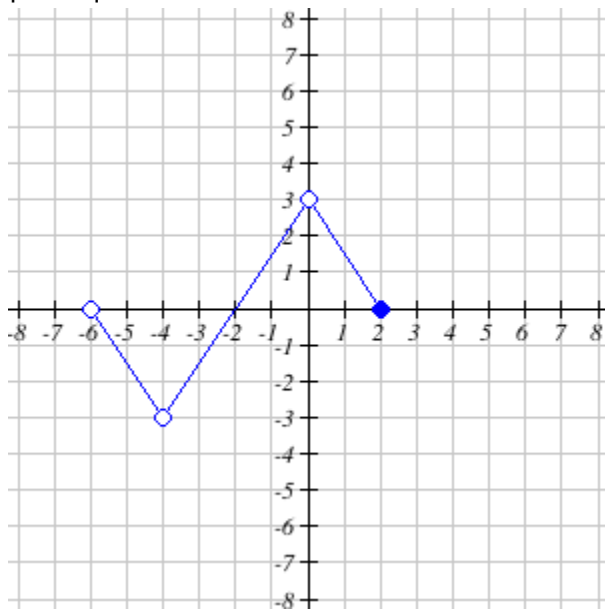
26.

27. $y = \sqrt[3]{x}$, No reflections , Vertical stretch by a factor of 5 , No vertical shift , Horizontal shift left 7 units

28. $y = \sqrt[3]{x}$, No reflections , Vertical compression by a factor of 3/4 , Vertical shift down 6 units , Horizontal shift left 8 units

29. $y = \sqrt[3]{x}$, Reflection across the y-axis , Vertical stretch by a factor of 8 , Vertical shift down 2 units , No horizontal shift

30. $y = |x + 3| - 1$

31. $|x + 1| + 1$
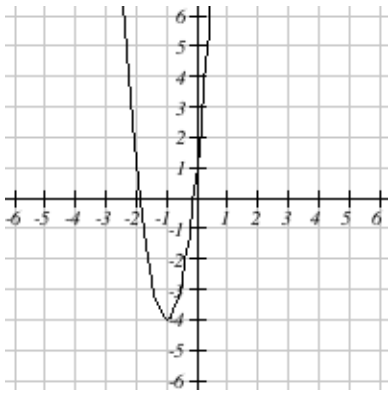
32.

33. 2 , 1

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Lecture 9 Answers

1.

$$R = \{(-3,0), (1,3), (4,6), (9,7), (11,13), (15,16)\}$$
$$S = \{(-5,0), (2,-6), (9,1), (-2,-7), (-3,-8), (8,4)\}$$
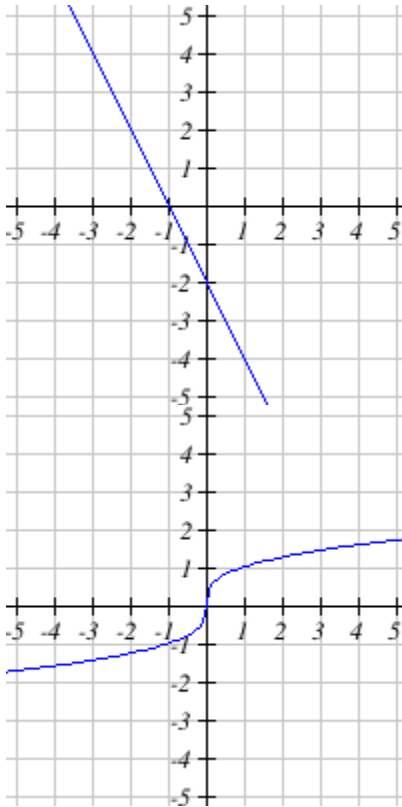$$F = \{(-3,-2), (0,0), (1,3), (6,5), (9,7), (16,13)\}$$

2.

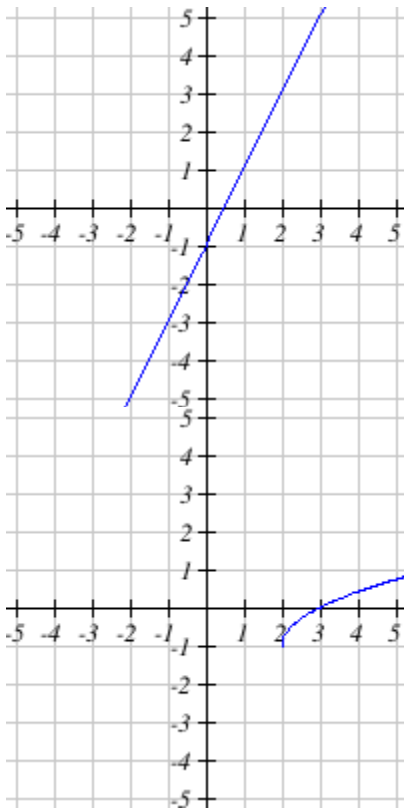| x	5	6	13
y	2	8	11

3. True

4. When a horizontal line intersects the graph of a function more than once, it indicates that for that output there is more than one input, which means the function is not one-to-one.

5.

6.

7. This relation is a one-to-one function
8. This relation is not a one-to-one function
9. False
10. False
11. $-5 , \frac{1}{6}$
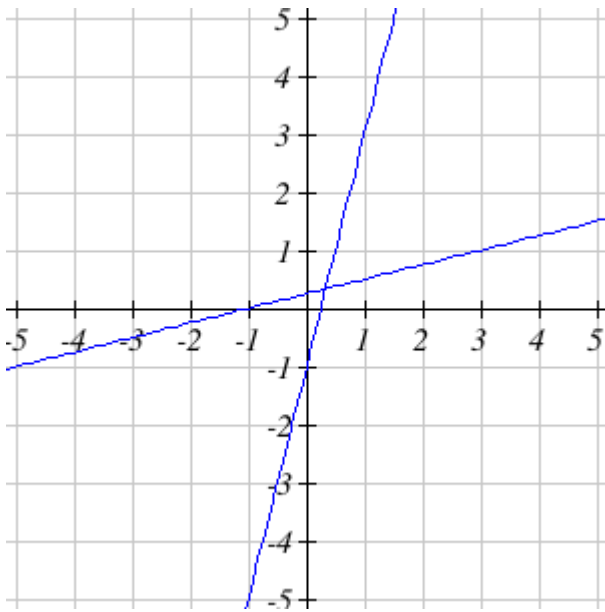12. 6 , -4
13. 6 , 4 , 5 , 8

14. x	3	5	8	12	15
y	1	4	9	11	16

15. 2 , 4 , 4 , 2
16. x , x , inverse
17. No, they are not inverses
18. No, they are not inverses
19. Yes, they are inverse
20. $9 - x$
21. $\frac{x-2}{3}$
22. $(x - 4)^3$
23. $(x - 6)^3$
24. $\frac{x+6}{9} , x$
25. $\sqrt[8]{x}$ or $x^{1/8}$
26. $\sqrt[3]{x}$ or $x^{1/3}$
27. $4x$

28. $\sqrt[9]{\frac{x+2}{5}}$ or $\left(\frac{x+2}{5}\right)^{1/9}$
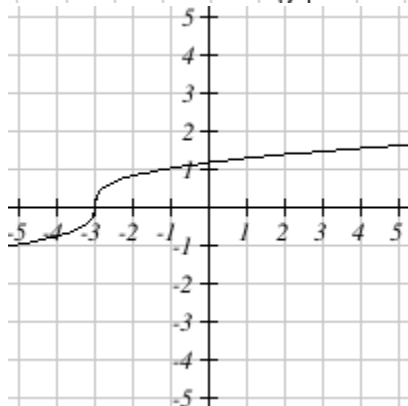
29. $[8, \infty)$, $\sqrt{x} + 8$

30. $\sqrt{\frac{x}{-5}}$, $x \leq 0$

31. $\frac{x+1}{4}$,
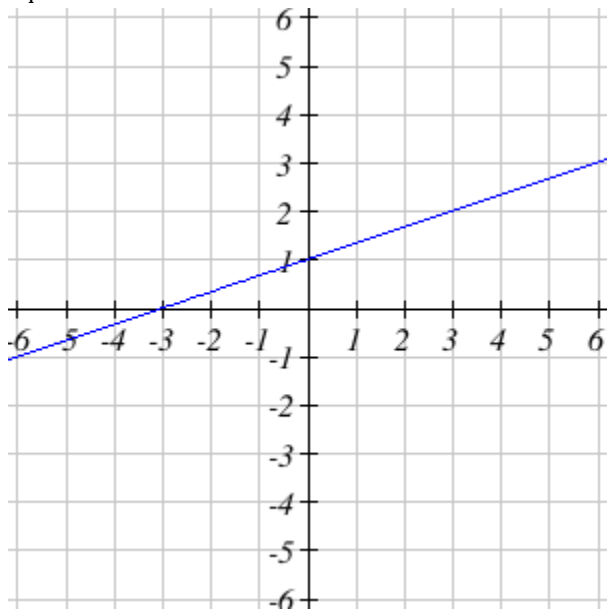
32.

33.

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**Lecture 10 Answers**

1. $\dfrac{6}{5}$

2. $\dfrac{3}{7}$

3. 0

4. DNE

5. There are many possible answers.

6. Yes

7. $\dfrac{4}{3}$

8. $-\dfrac{7}{3}, -\dfrac{7}{6}, -\dfrac{14}{15}$

9. 0

10. *DNE*

11. 40

12.
   $\dfrac{11}{2}$ pounds per month

   5.5 pounds per month

   55 pounds every 10 months

   one pound per $\dfrac{2}{11}$ months

   66 pounds per year

13. 3 , The cost per square yard of carpet

14. Yes, the ratio of change in input to change in output is constant

15. No, the ratio of change in input to change in output is not constant
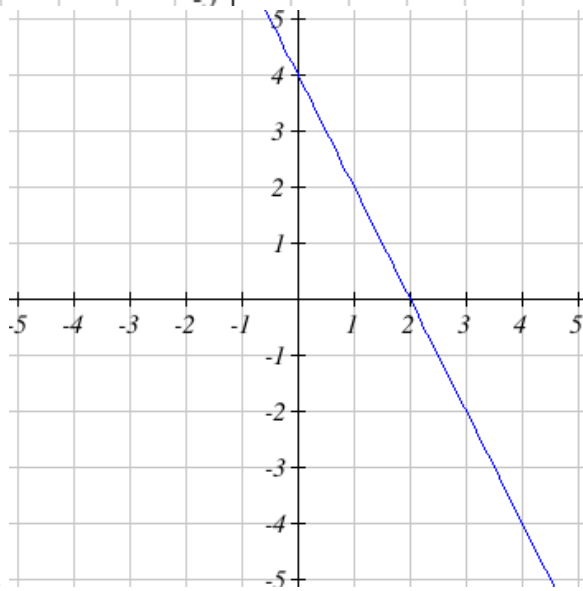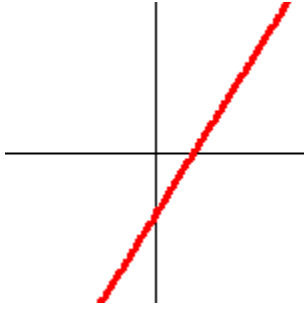
16. There are many possible answers.

17.

 , ,

 , ,
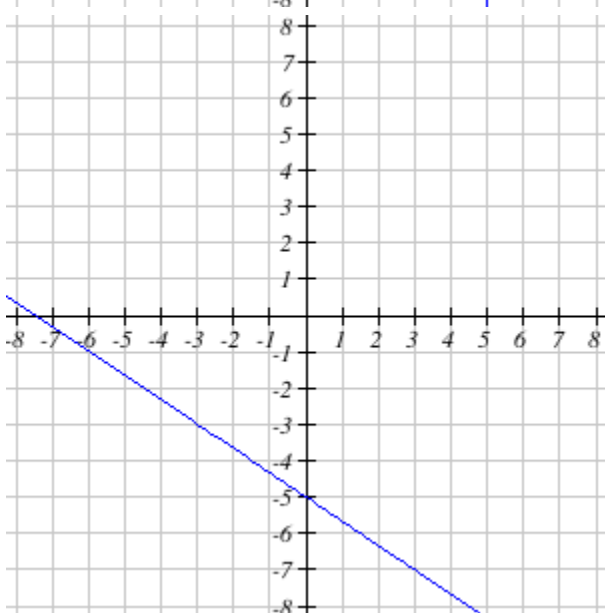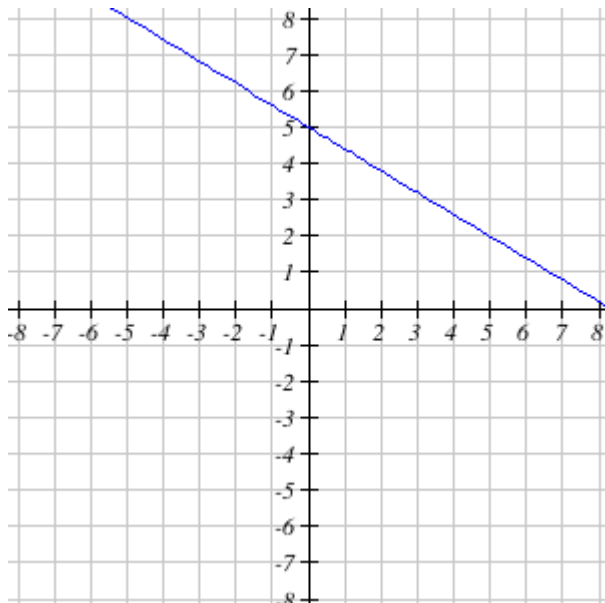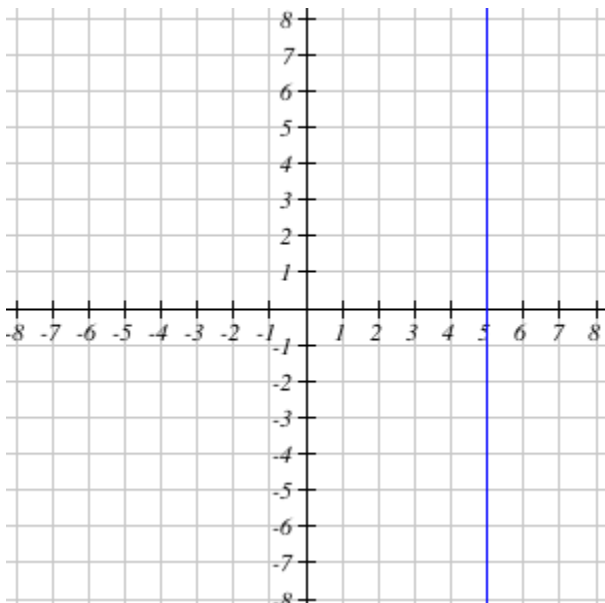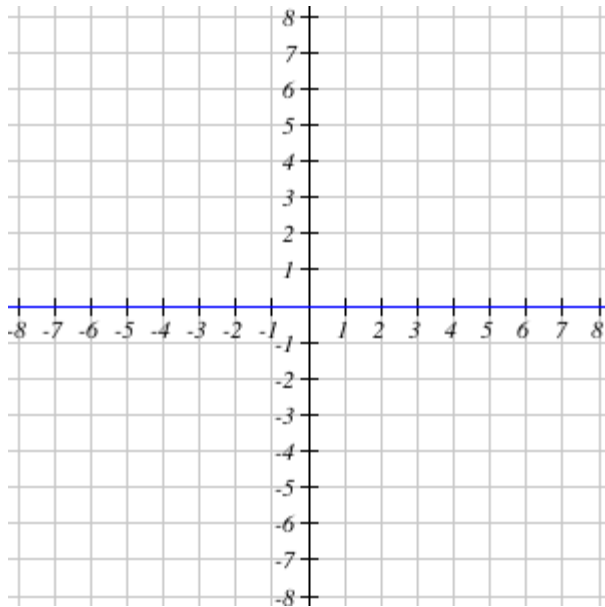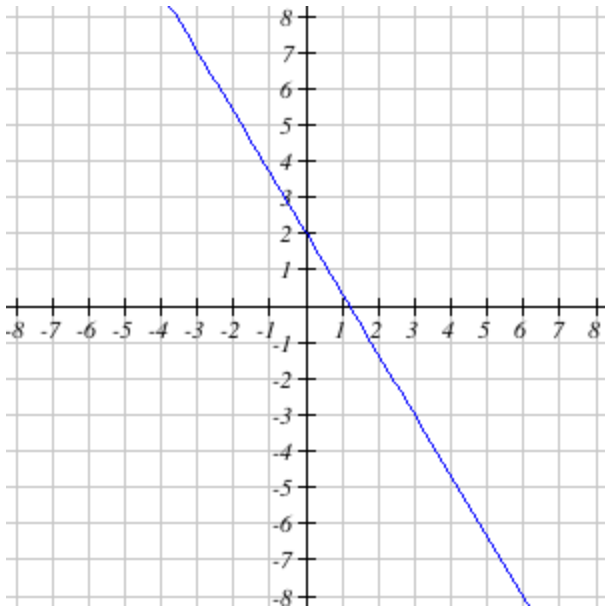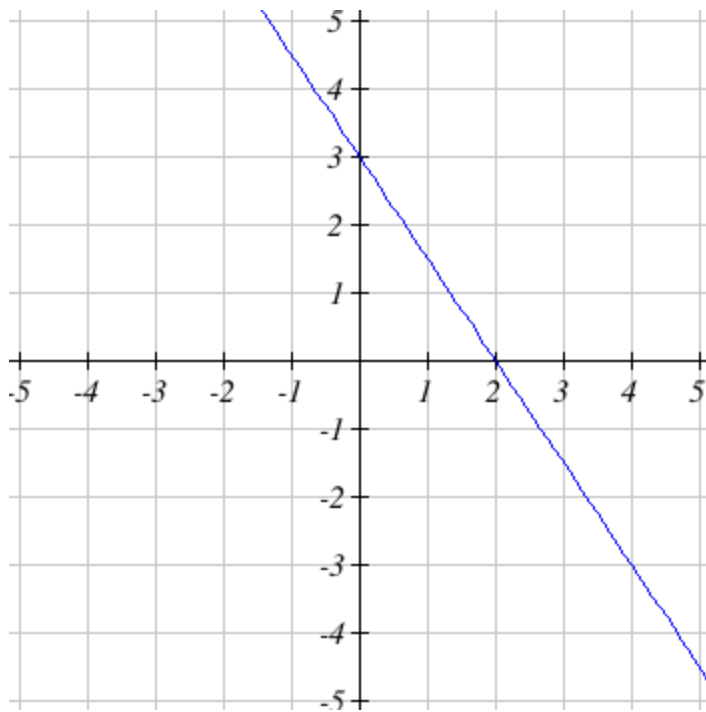
18.
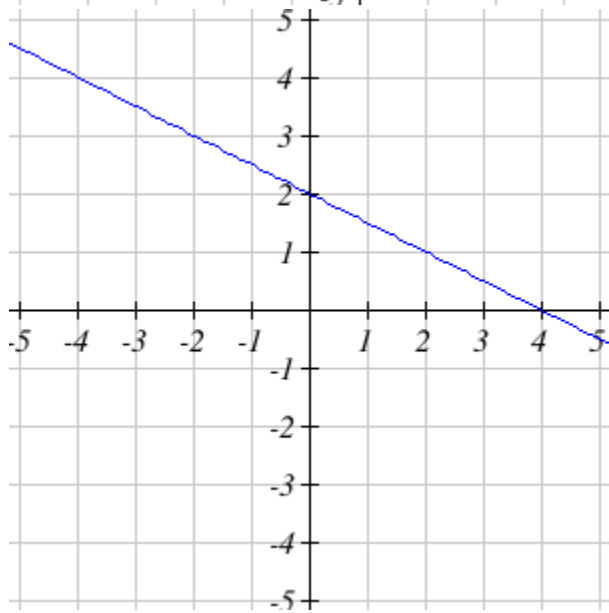
19.

20. 2 , 4 ,

21. $\left(-\frac{3}{2}, 0\right)$, $(0, -3)$

22. -15 , -6

23.

24. $y = -6$

25. $x = 8$

26. There are many possible answers

27. $-\frac{1}{6}x + \frac{19}{6}$

28. $\frac{1}{3}(x + 5) - 8$ or $\frac{1}{3}(x + 8) - 9$

29. $y + 3 = 5(x - 7)$ or $y = 5(x - 7) - 3$, $y = 5x - 38$

30. $-\frac{8}{7}, 0$

31. $y = -\frac{1}{4}x$, $y = -\frac{5}{4}x + 3$, $y = 1$, $y = 5x - 2$, $x = 5$

32. $4x - 3$

33. There are many possible answers

34. they intersect at a right angle

35. $\frac{1}{5}x + 4$

36. $-\frac{5}{4}, 1$

37. There are many possible answers

38. $70x + 20$, 5
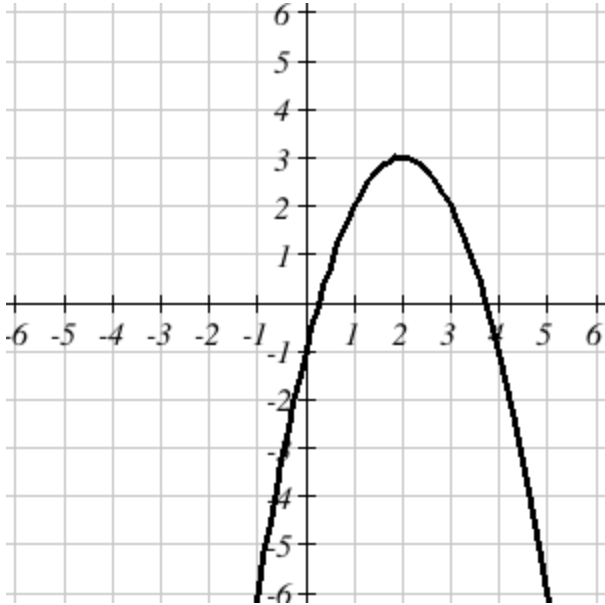
39. $80t + 3960$, 4920

40. V(t) = 131500 - 4500t , $122500

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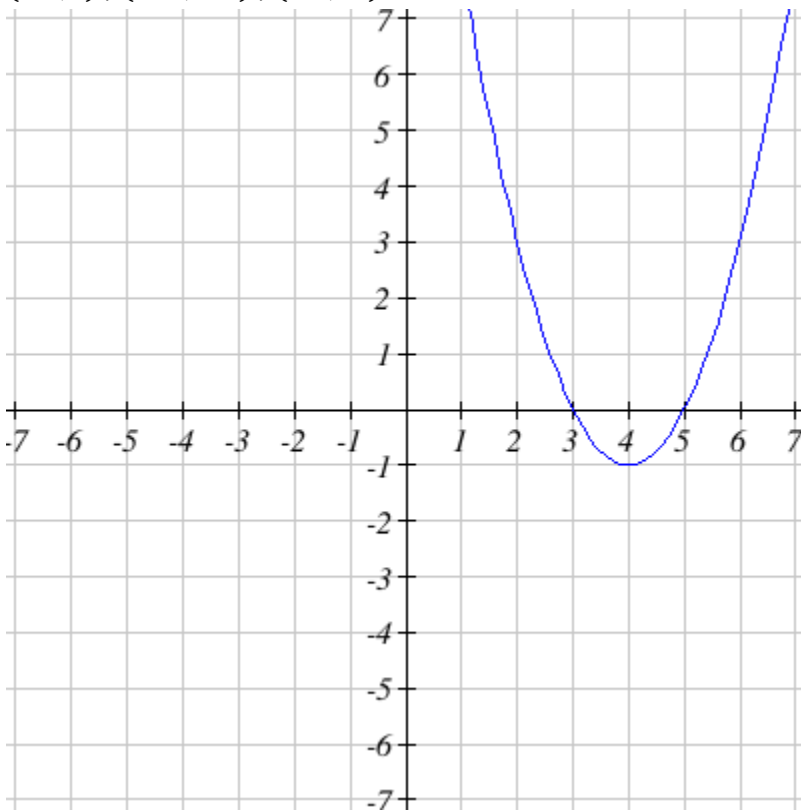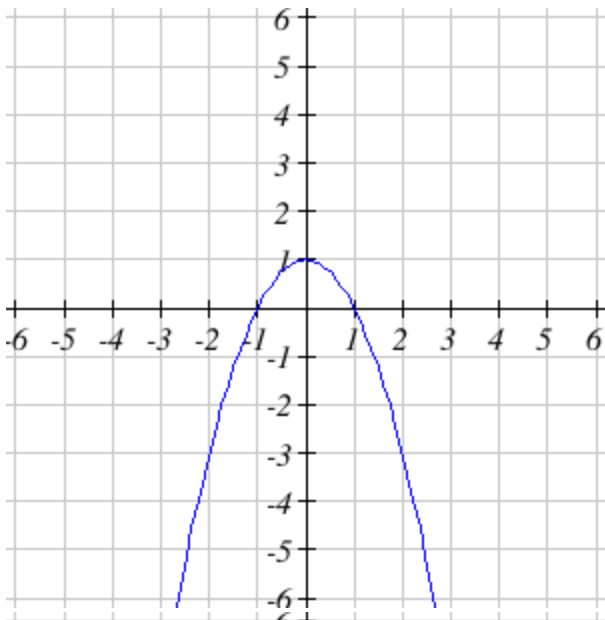**Lecture 11 Answers**

1. all of the above

2.

3. narrower , opposite
4. $y = -x^2 + 11x + 7$
5. minimum , -3 , -4 , $(-4, \infty)$, $(-\infty, -4)$
6. $(-4,2)$, $(-\infty, -4)$, $(-4, \infty)$

7.
8. $(4, -5)$, $x = 4$, downwards
9. There are many possible answers.

10.

11.
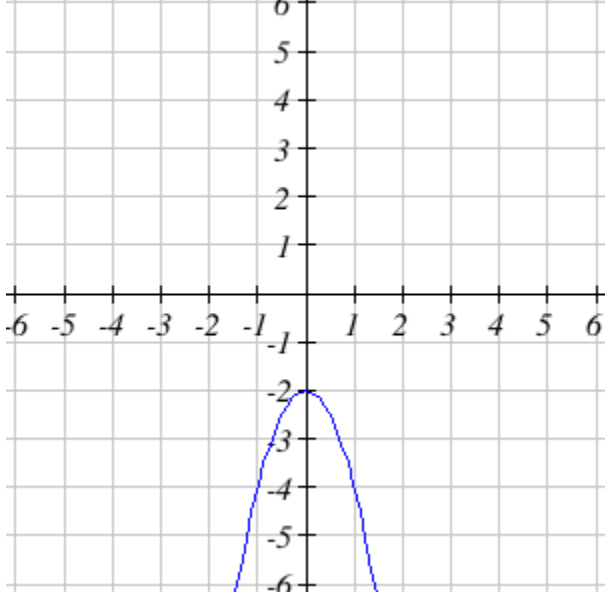
12. -1 , 1 , 2 ,
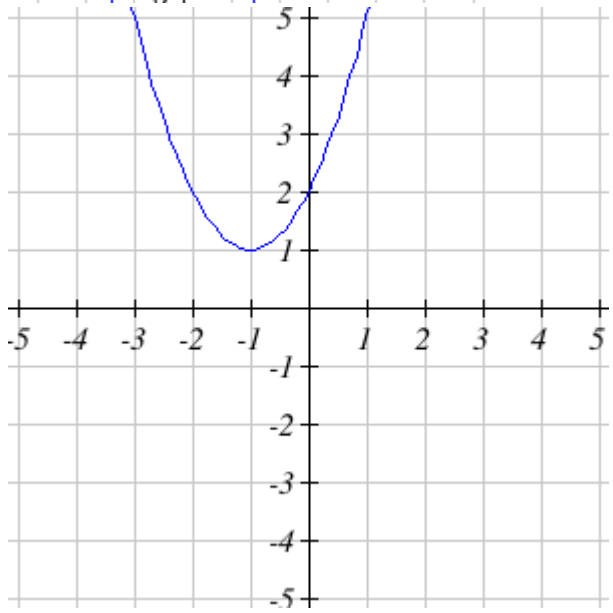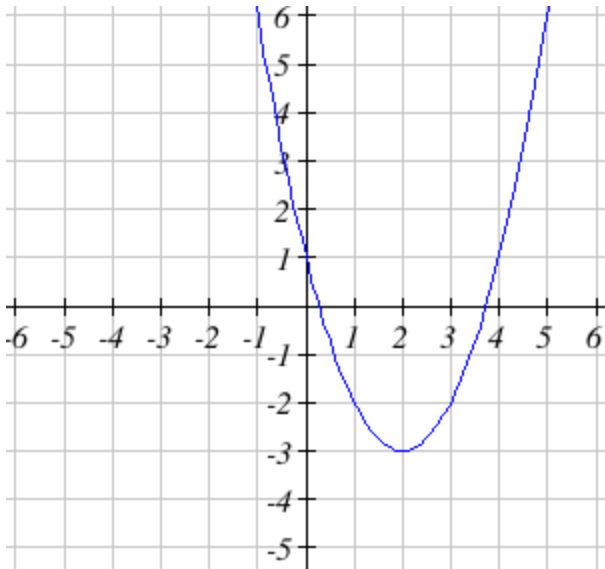
13.

, All real numbers , $y \geq -3$
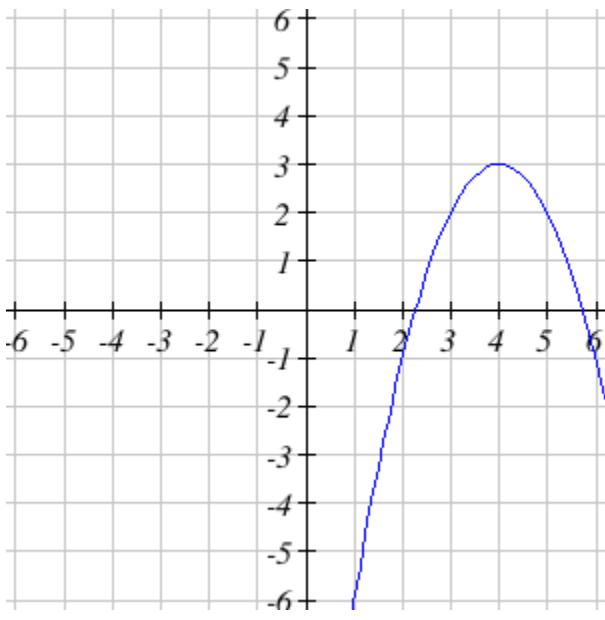
14.

, All real numbers , $y \leq 3$

15.
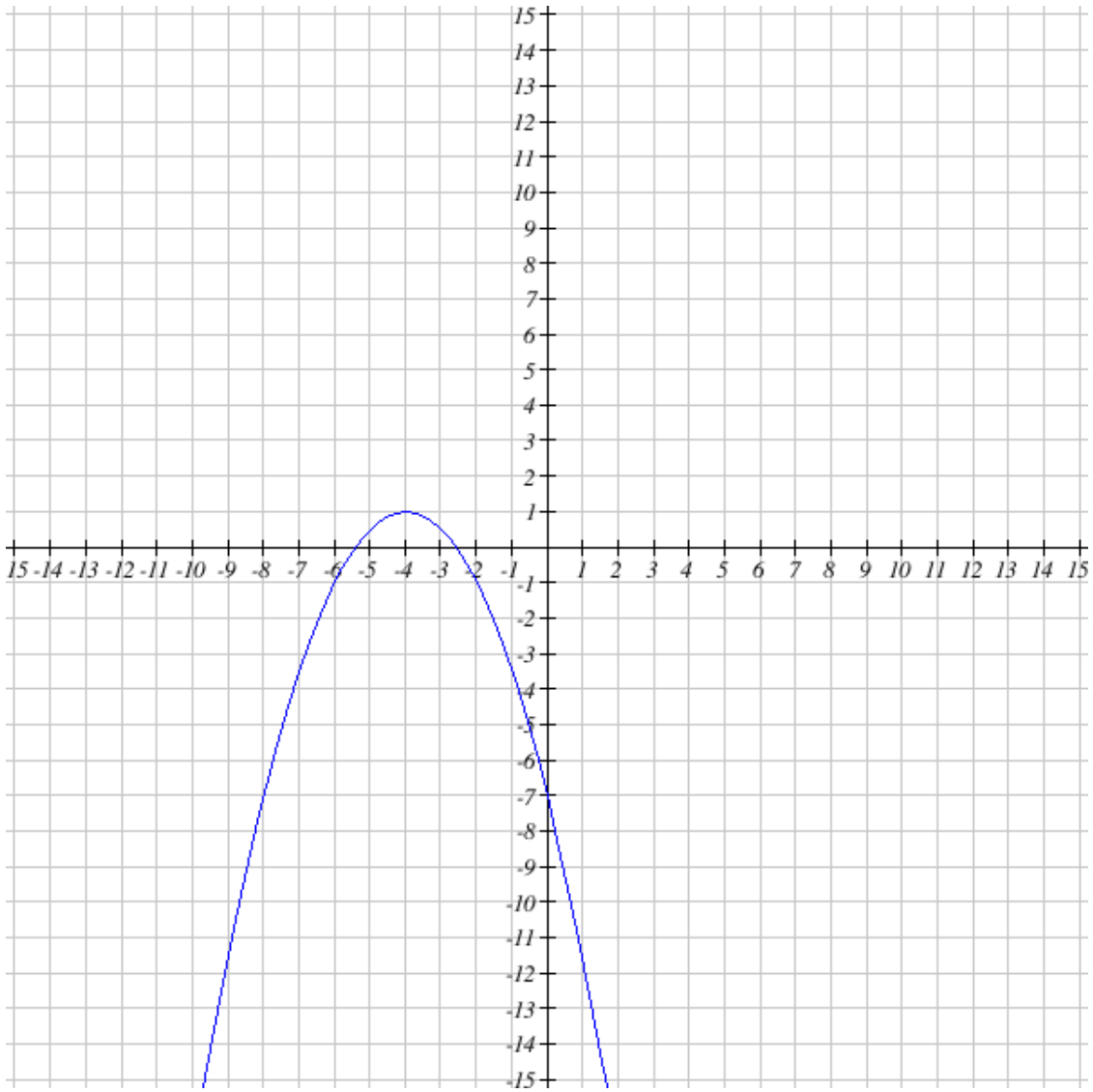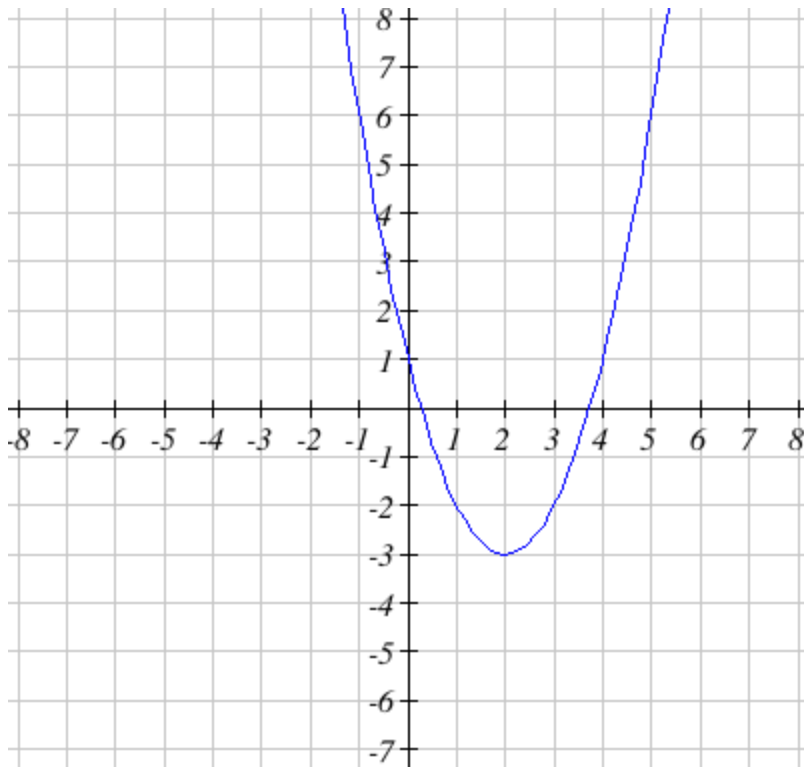
16.
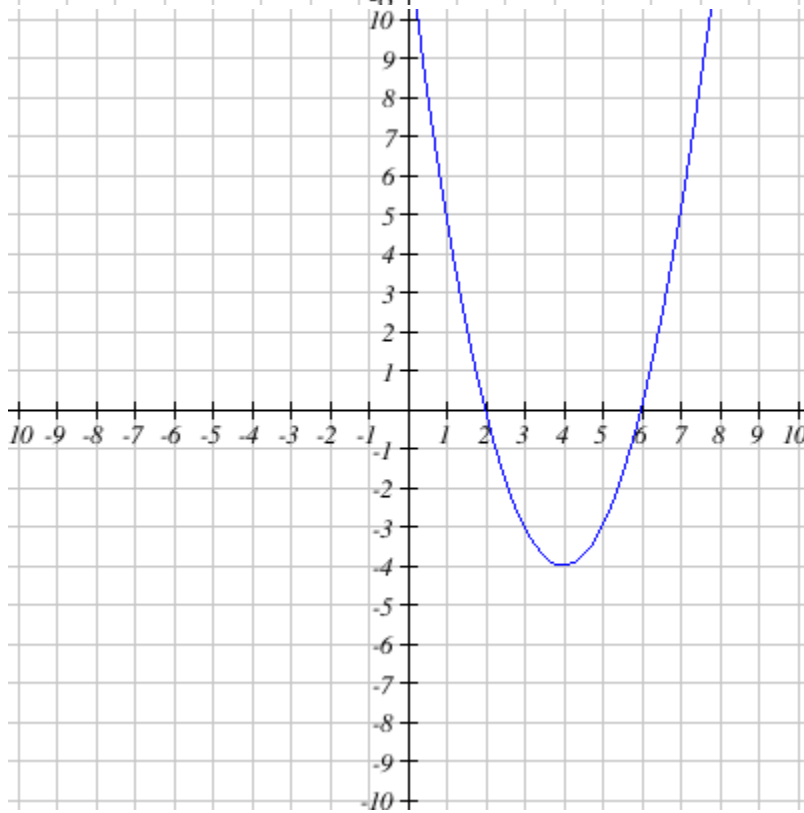
17. , $(4,-4)$, $(0,12)$, $(2,0), (6,0)$, $(-\infty, \infty)$, $[-4, \infty)$, x=4

18. -1 , 5 , 5 , 2 , 9 , $x = 2$

19. $(3,12)$, $(0, -24)$, $\left(3 + \sqrt{3}, 0\right), \left(3 - \sqrt{3}, 0\right)$, $(1.27,0), (4.73,0)$

20. $\left(3 + \sqrt{\frac{8}{3}}, 0\right), \left(3 - \sqrt{\frac{8}{3}}, 0\right)$

21. 60 , -159
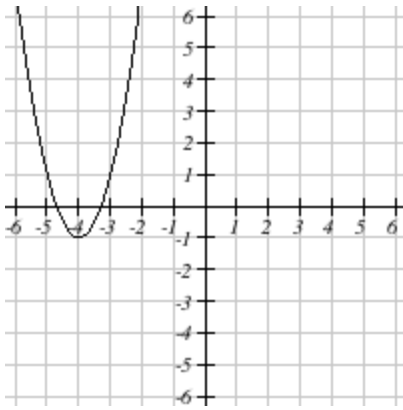
22.

23. $2 \cdot (x+1)^2 + 0$

24. $3(x-1)^2 + 4$

25. $(x-5)^2 - 9$, $(5,-9)$

26. $(x+2)^2 + 1$, $(x-8)^2 - 8$

27. $x^2 - 17$

28. $x^2 + 6x - 54$

29. , 90

30. The h intercept , The h coordinate of the vertex , The t intercept

31. 1156 , 2.5 , 11

32. 225 , 7

33. 190 , 190 , 36100

34. $w \cdot (450 - 2 \cdot w)$, 112.5 , 25312.5

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Lecture 12 Answers

1. No, a polynomial is a function so it can only have one output for each input.
2. $\frac{1}{27}$
3. -5
4. $10x^5 + 3x^4 + 9x^3 - 10x^2 + 6$
5. $\frac{1}{49}x^2 + \frac{1}{7}x + \frac{1}{4}$
6. ∞ , ∞
7. $-\infty$, ∞
8. ∞ , $-\infty$
9. ∞ , ∞
10. 8 , 6 , 8
11. 12 , 11
12. 3
13. 2
14. $(0,90)$, $(6,0), (-5,0), (3,0)$
15. $(0,0)$, $(0,0), (-5,0), (7,0)$

16.

17.
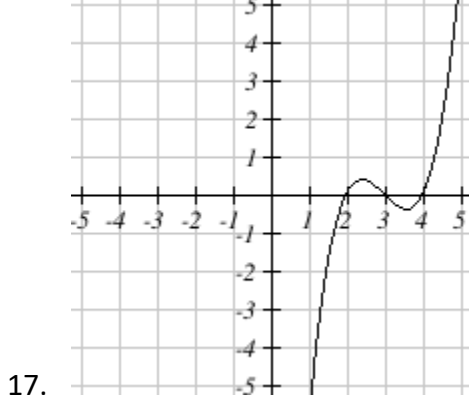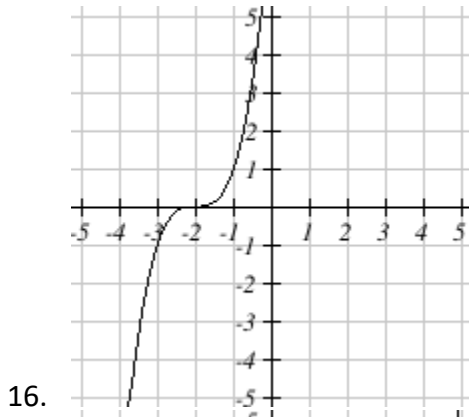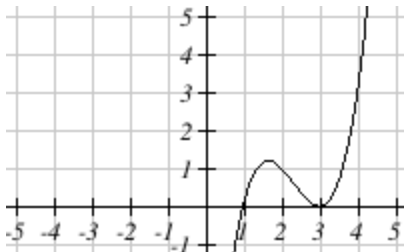
18.
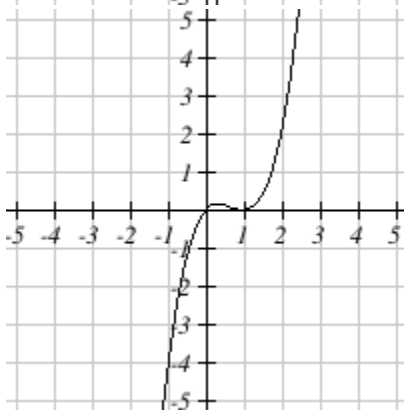
19.
20. $x^2 \cdot (x-3)^2 \cdot (x+3)$
21. $0.2 \cdot x \cdot (x-4)^2 \cdot (x+4)$
22. $-0.1 \cdot (x-5)^2 \cdot (x+4)$
23. $\frac{1}{18} \cdot (x+3)(x+1)(x-3)(x-2)$
24. $-\frac{1}{8} \cdot (x+4)(x+4)(x-1)(x-1)(x-1)$
25. $x-7 , 2 \cdot x + 5$
26. $x+3 , 6$
27. $x^2 - 2x - 1$
28. $x^2 + 7x - 5 + \frac{7}{x-4}$
29. $x^2 + 6 \cdot x + 5 , 4$
30. $x^2 - 2x + 4 , 2$
31. $x^3 + x^2 + 6x + 5 , 5$
32. $x^4 + 5 \cdot x^2 + 7 , -3$

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Lecture 13 Answers

1. i
2. -1 , -20
3. $10i$
4. $7 - 9i$
5. $i\sqrt{26}$
6. $3\sqrt{2} \cdot i$
7. $4i\sqrt{5}$
8. $19 - 8i$, $9 - 42i$
9. -35
10. 36
11. $32 + 74i$
12. $13 + 107i$
13. $11 + 60i$
14. $-14 + 8i$
15. $-80 + 48i$
16. $10 - 4i$
17. $-30 + 18i$, 18 , 116 , real
18. $\frac{1}{4} - \frac{3}{4}i$
19. $-5 - 12i$
20. $\frac{-10-4i}{29}$
21. i , 1 , 1 , -1 , -1 , -i , 1 , i
22. $-3 - 4i$
23. $\sqrt{3}, -\sqrt{3}$
24. $5i, -5i$
25. $i\sqrt{11}, -i\sqrt{11}$
26. $-3 - 1i, -3 + 1i$
27. $4 + 3\sqrt{6}i, 4 - 3\sqrt{6}i$
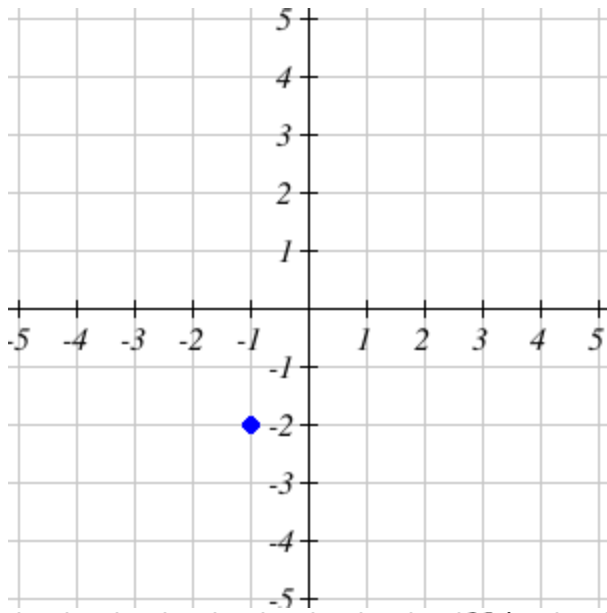
28.
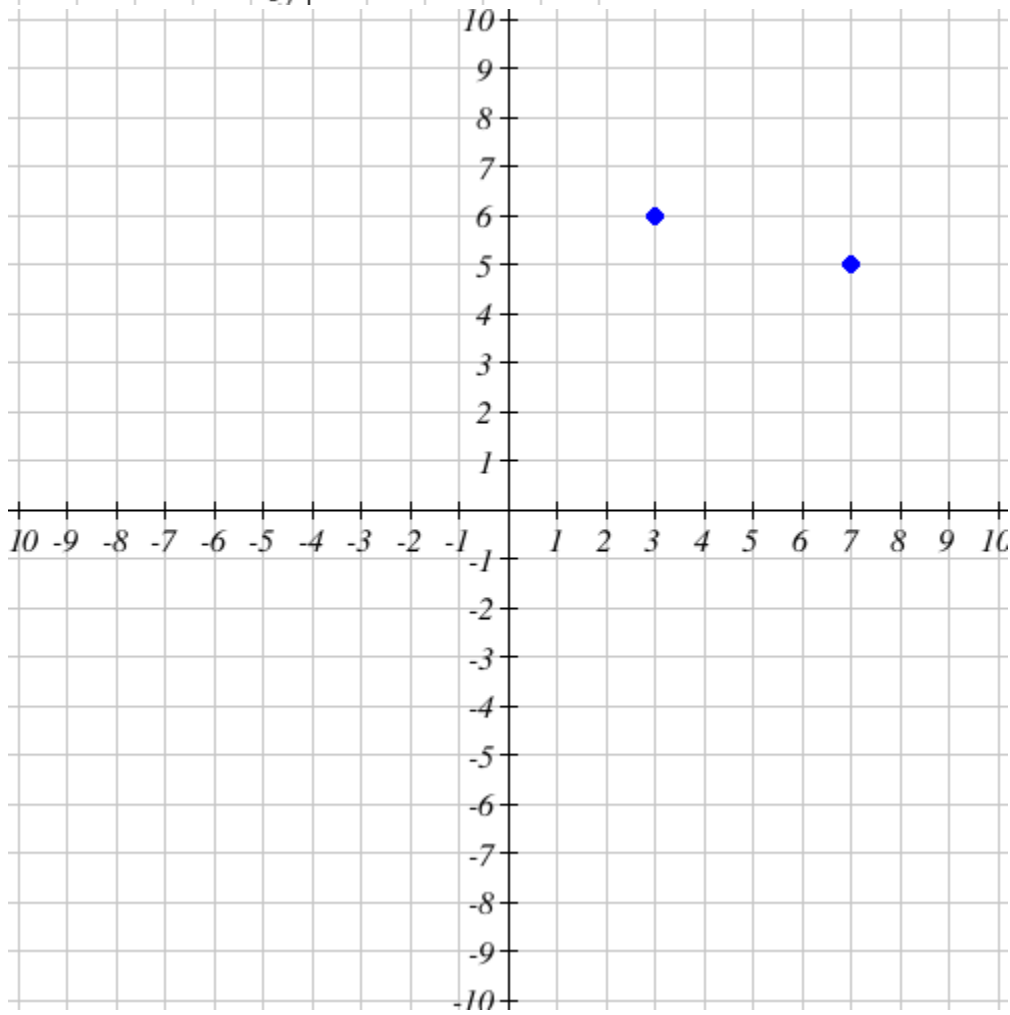
29.

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Lecture 14 Answers

1. No, it is a not factor.
2. $\frac{1}{3}, -\frac{5}{3}, 2$
3. $-2, 2 + \sqrt{2}, 2 - \sqrt{2}$
4. $5, -2 + \sqrt{2}, -2 - \sqrt{2}$
5. $5, i, -i$
6. $-1, -1 + \frac{\sqrt{3}}{3}i, -1 - \frac{\sqrt{3}}{3}i$
7. $P(x) = (x + 1)(x + 2i)(x - 2i)$
8. $P(x) = (x - 3)(x + 1)(3x - 1)(x - 2i)(x + 2i)$
9. -12
10. 1, 2, 3, 4, 6, 8, 12, 24, 1/2, 3/2, 1/3, 2/3, 4/3, 8/3, 1/6 , $6, -\frac{1}{3}, -2$
11. 1, 2, 3, 6, 9, 18, 27, 54, 1/2, 3/2, 9/2, 27/2 , $-\frac{1}{2}, 3\sqrt{2}, -3\sqrt{2}, 3$
12. 1, 2, 3, 4, 6, 8, 12, 24, 1/2, 3/2, 1/3, 2/3, 4/3, 8/3, 1/6 , $6, -\frac{1}{3}, -2$
13. 1, 2, 3, 6, 9, 18, 27, 54, 1/2, 3/2, 9/2, 27/2 , $-\frac{1}{2}, 3\sqrt{2}, -3\sqrt{2}, 3$

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Lecture 15 Answers

1. $\frac{2}{9z^2}$

2. $\frac{z-6}{2}$

3. $\frac{9}{m+4}$

4. $x - 12$, 5

5. $\frac{2}{n+6}$, -7

6. $\frac{x+6}{x-3}$, -3

7. 1, -11

8. -1, 15

9. $\frac{5x^5}{y^3}$

10. $\frac{x-4}{x+2}$, $-5, 3, -3$

11. $\frac{x+2}{x+4}$, $-1, 5, 1, -2$

12. $(x + 10)(x - 12)$

13. $(x - 2)(x - 10)(x + 5)$

14. $(x + 10)^9(x + 8)^7$

15. $\frac{-2x+2}{(x+1)(x-3)}$

16. $\frac{8k-59}{(k-8)^2}$

17. $\frac{x^2+5x}{(x+3)(x-3)}$

18. $\frac{x+5}{x+6}$, -3

19. Multiply both sides by $x + 7$

20. 18

21. -1

22. 7

23. $-\frac{12}{7}$

24. 5

25. $\frac{42}{19}$

26. -9

27. DNE

28. -17

29. 5

30. 48

31. 15

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Lecture 16 Answers

1. 19 , 48,-75
2. 10 , 6
3. -1 , 6
4. $(0, -9)$, $(3,0), \left(\frac{3}{2}, 0\right)$, $1, -\frac{1}{2}$
5. a Horizontal asymptote at y=0 , a Horizontal asymptote at y=1 , No horizontal asymptote
6. $-\frac{1}{3}$
7. $\left(0, \frac{2}{3}\right)$, $(4,0), \left(\frac{1}{2}, 0\right)$, $-3, -\frac{2}{3}, \frac{2}{3}$
8. $-12 \cdot \frac{(x-2)(x+1)}{(x+2)(x+3)}$
9. $7 \cdot \frac{(x-6)(x-2)}{(x+4)(x+1)}$
10. $\frac{-8(x-3)}{3(x+1) \cdot (x-4)}$
11. $-24 \cdot \frac{x-2}{(x+3) \cdot (x-4)^2}$
12. $5.4 \cdot \frac{(x-1)^2}{(x+2) \cdot (x-3)^2}$
13. $-2 \cdot x \cdot \frac{x-2}{(x+2) \cdot (x-4)}$
14. $32 \cdot \frac{x-2}{(x+2) \cdot (x-4)^2}$

15.

16.

17.

18.

19.

20.

21.

22.

-7-6-5-4-3-2-1 | 1 2 3 4 5 6 7 8 9 10 11
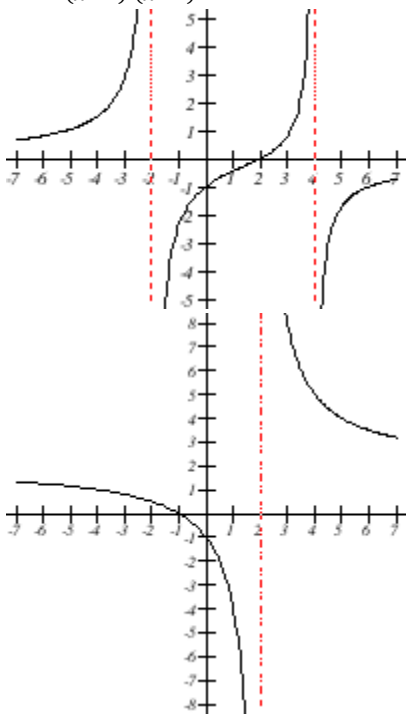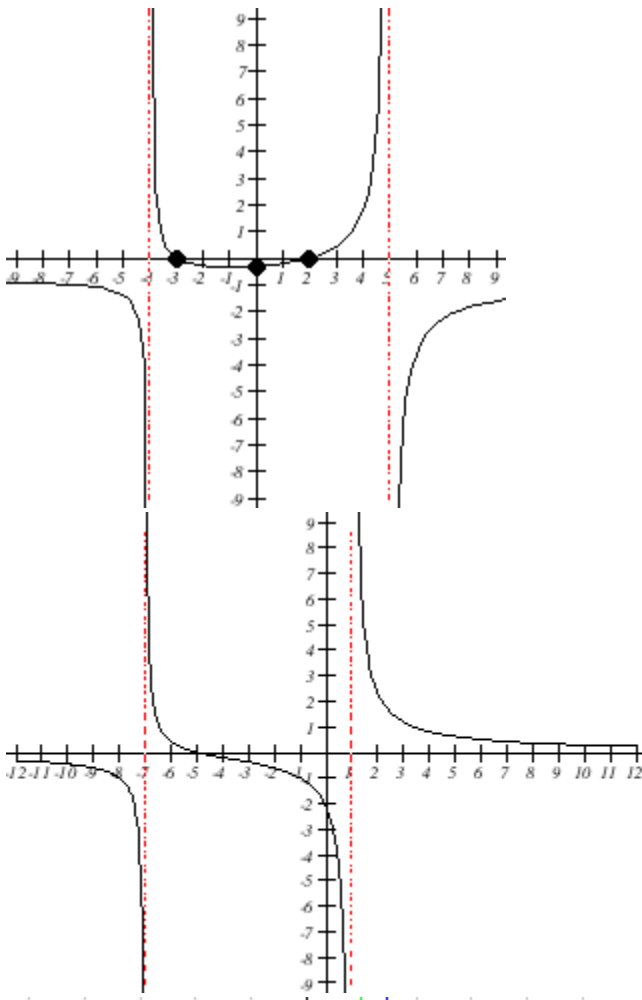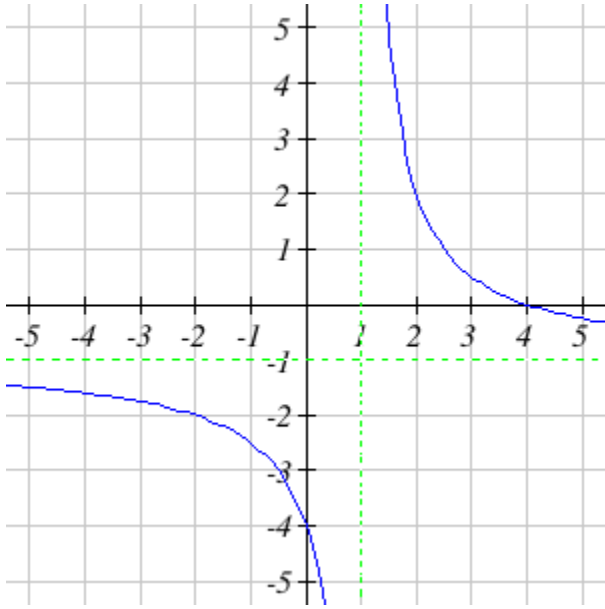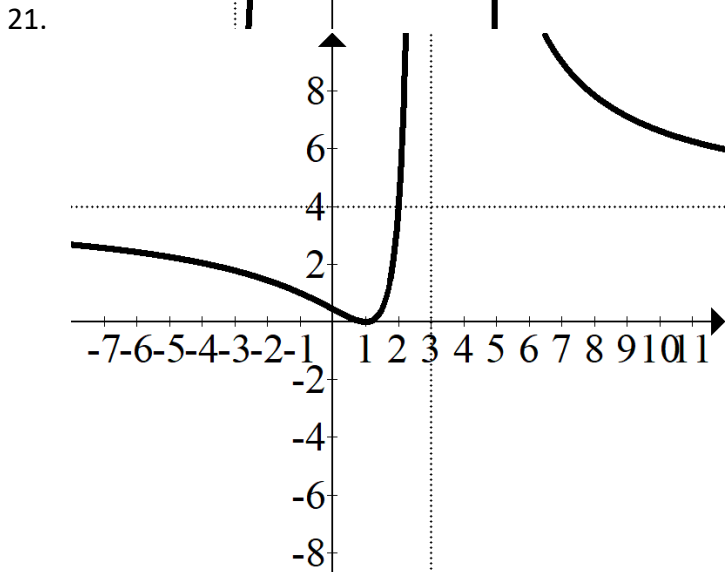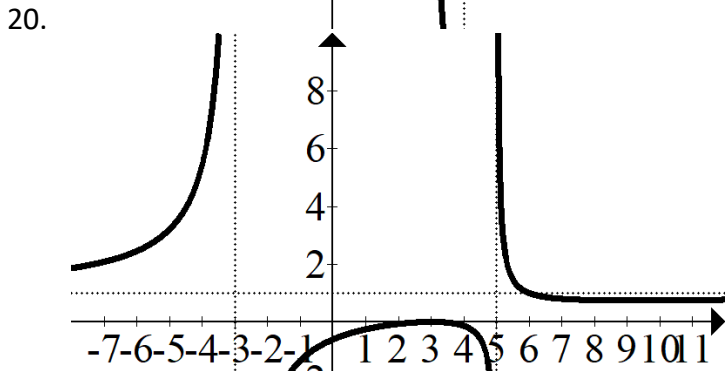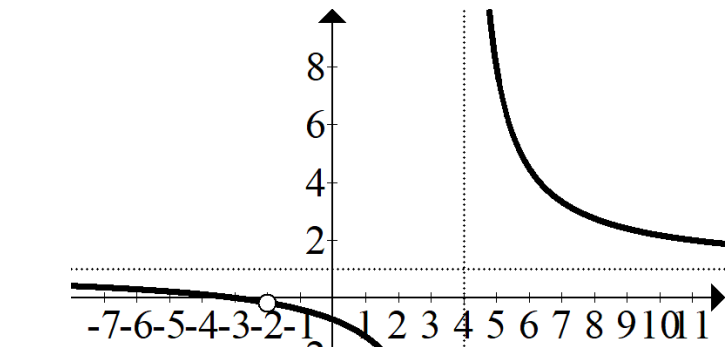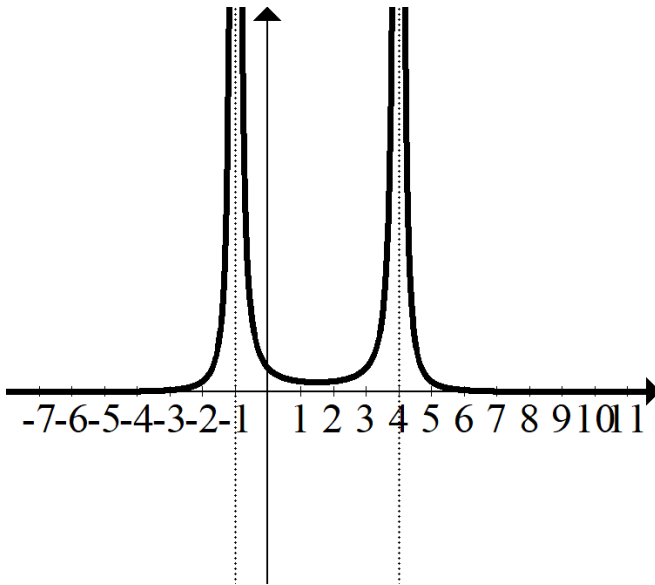
23.

24. 54 ,   36 ,   14 ,   0 ,   In time, the ant colony will no longer populate the house.

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Lecture 17 Answers

1. 15

2. (-oo,3] ,

-8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8

3. (-4,-3)

4. $b > 5$,

-7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7

5. $a \le 1$,

-7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7
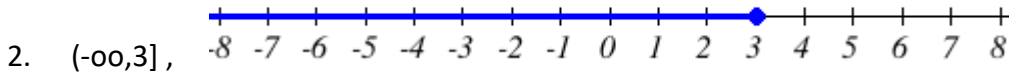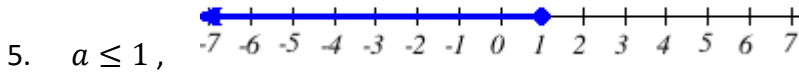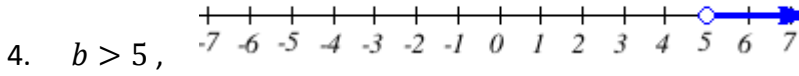
6. $x < -\frac{1}{3}$

7. $-\frac{1}{4} < x < 1$

8. $(-\infty, 130]$

9. $x > 0$, $x < 0$, $x = 0$

10. $x < 1$, $x > 1$, $x = 1$

11. $x > 2$

12. 20 ,   Kimberly ,   [0,4)

13.

10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10

14.

10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10

15. $\left(-\infty, -\frac{2}{3}\right] \cup \left[\frac{5}{3}, \infty\right)$

16.

10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10

17.

10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10

18.

10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10

19.

10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10

20. $\left[-\frac{8}{3}, -\frac{1}{3}\right]$

21. $\left(-\infty, -\frac{3}{4}\right] \cup \left[\frac{3}{2}, \infty\right)$

22. DNE

23. $(-\infty, \infty)$

A number line from -10 to 10 with open circles at -6 and 4, shaded arrows extending left from -6 and right from 4.
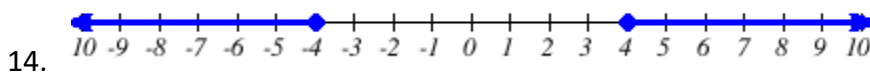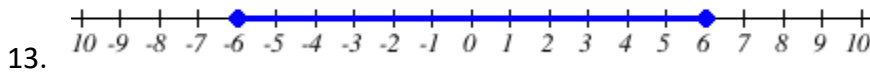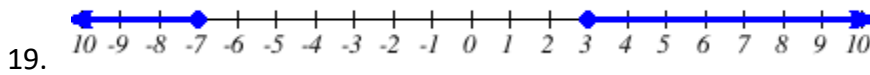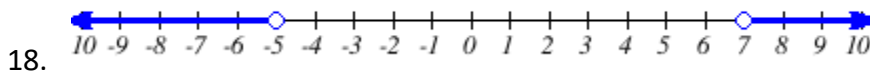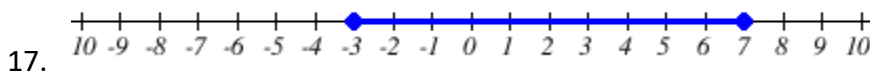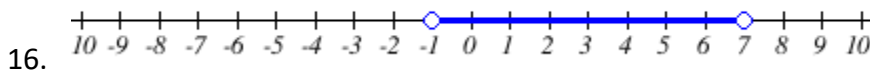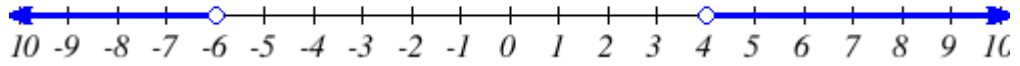
1. $x < -6$ or $x > 4$, $10\ \text{-}9\ \text{-}8\ \text{-}7\ \text{-}6\ \text{-}5\ \text{-}4\ \text{-}3\ \text{-}2\ \text{-}1\ 0\ 1\ 2\ 3\ 4\ 5\ 6\ 7\ 8\ 9\ 10$
2. $(-\infty, 3] \cup [4, \infty)$
3. $(-\infty, -6) \cup (3, \infty)$
4. $(-\infty, -2) \cup \left(\frac{1}{3}, \infty\right)$
5. $(-\infty, \infty)$
6. $[2 - \sqrt{2}, 2 + \sqrt{2}]$
7. $(-\infty, -5) \cup (-4, 6)$
8. $[-8, 9]$
9. $(-\infty, -7] \cup [0, \infty)$
10. $(-5, 2) \cup (2, 4)$
11. $(-\infty, -4) \cup (-2, 2) \cup (4, \infty)$
12. $(-\infty, -8) \cup \left(-\frac{15}{2}, \infty\right)$
13. $\left(-\infty, \frac{1}{7}\right) \cup \left[\frac{7}{6}, \infty\right)$
14. $(-\infty, -3] \cup (6, \infty)$
15. $(-\infty, -1) \cup \left(-\frac{1}{2}, \infty\right)$
16. $(-7, 3) \cup (7, \infty)$
17. $(-\infty, -6) \cup (4, 6)$
18. $(-\infty, -5) \cup (-5, 3] \cup [4, \infty)$
19. $(0, 4) \cup (7, \infty)$
20. $(-\infty, 0] \cup [2, 3)$
21. $(-5, 1) \cup (3, \infty)$
22. $[-12, 1) \cup [4, \infty)$

1. An ordered pair that makes both equations true.
2. True
3. $(-1,5)$

4. , $(1,6)$

5. , $(-7,3)$
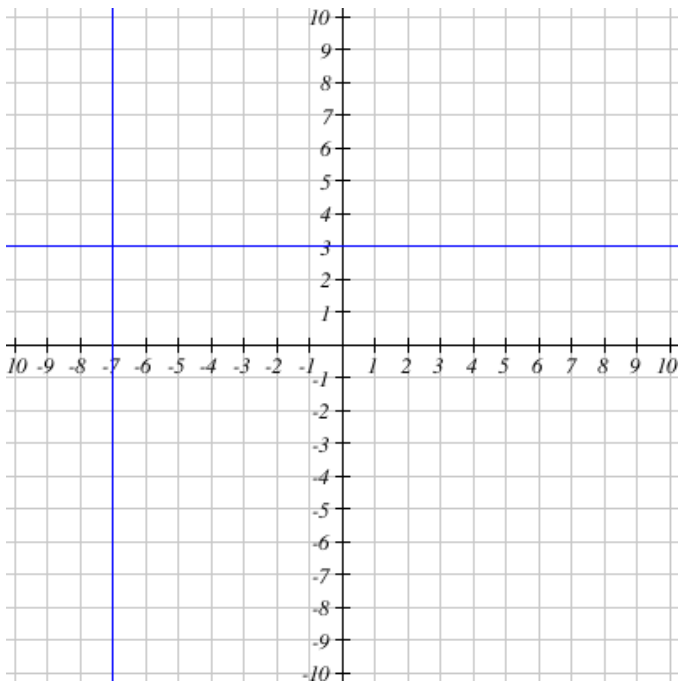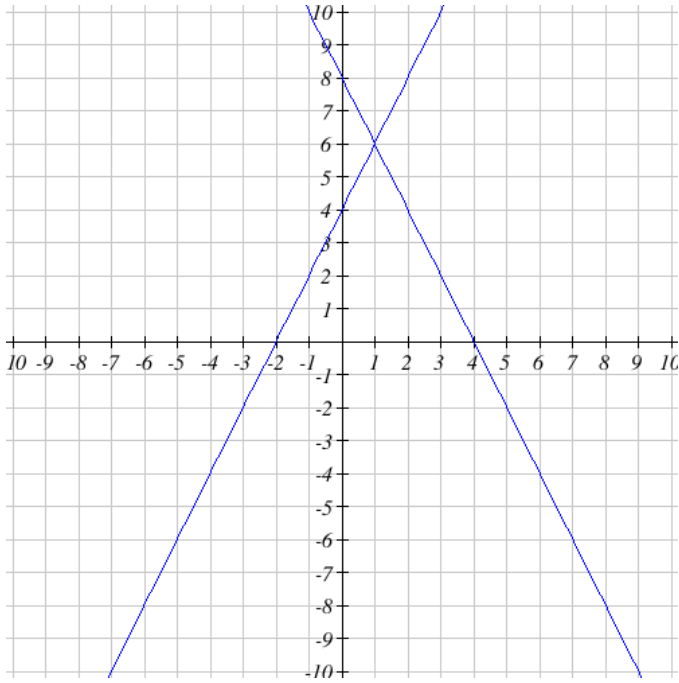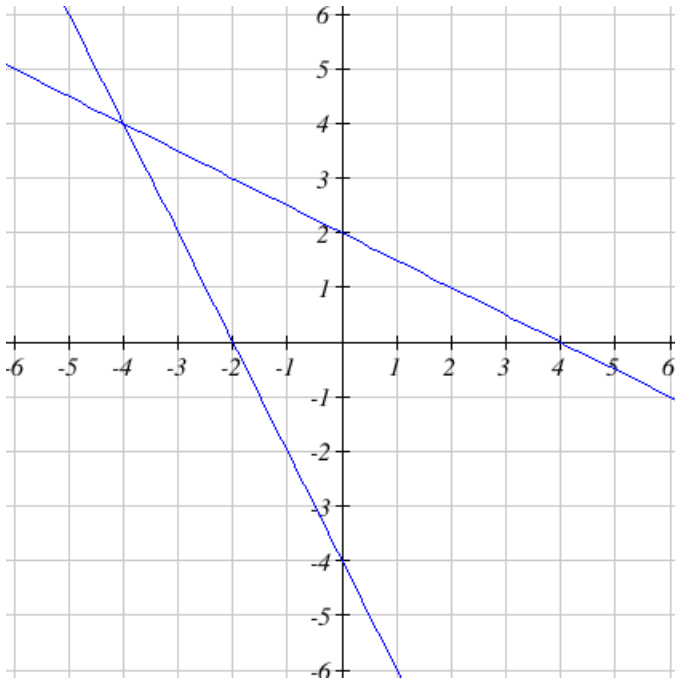
6.   , $(-4,4)$

7.   An infinite number of solutions. ,   This is a consistent system. ,   The equations are dependent.

8.   an infinite number of solutions.

9. $-4 \cdot x - 4$, $-4 \cdot x - 4$,   Consistent-dependent

10. $(4,3)$

11.   -2 ,   -6

12.   0 ,   -2

13. $(-4,3)$

14.   -3.2 ,   -3.6

15.   Infinite number of solutions

16. $(6,2)$

17. $(5,0)$

18.   No solution

19.   15

20.   164 ,   200

21. $x + y = 8200$, $0.06x + 0.09y = 600$,   4600 ,   3600

22. $\begin{cases} x & + & y & = & 800 \\ 8x & + & 4y & = & 5000 \end{cases}$

23.   9 ,   5

24.   500 ,   1500

25. $\left(-\sqrt{3},-\sqrt{2}\right),\left(-\sqrt{3},\sqrt{2}\right),\left(\sqrt{3},-\sqrt{2}\right),\left(\sqrt{3},\sqrt{2}\right)$

26. $(-2,1),(0,5)$

27.   (-4 ,-3) ,(4,-3)

28.   2 ,   1

29.   (-1 , 0) ,(1,0)

30.   -1 ,   -3 ,   3 ,   1

31.   15 ,   10

32.   There are many possible solutions

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Lecture 20 Answers

1. NOT an exponential function
2. exponential growth
3. exponential decay
4.
   The Domain of the exponential functions is All Real Numbers .
   The Range of the exponential functions is $f(x) > 0$.
   The Horizontal Asymptote is the line $y = 0$.
5. orange (O) , red (R) , green (G)
6. c b a
7. 8 , 4
8. 7000 , 0.9
9. $3(4)^x$
10. $28100 \cdot (1.06)^t$, 44787
11. $12000(1.034)^t$
12. $19000(0.92)^t$
13. 18259
14. 44.673881799593
15. -0.2260 , -22.60 , 4,650
16. 12.3
17. 0.0553 , 5.53 , 170,000
18. -0.1252 , -12.52 , 8,700
19. 5992.2 , No, because by 2026, the radioactive element remaining in the area is greater than 800 Bqs.
20. $C = 110 \cdot \left(\frac{1}{2}\right)^{\frac{t}{5.6}}$, about 31.9 mg , about 13.77 hours
21. $9^x + 4$, 9^{x-1} , -9^x
22. $f(x) = 2^x$
23. $f(x) = \frac{1}{3} \cdot 4^x$
24. $f(x) = \left(\frac{1}{5}\right)^x + 4$
25. $f(x) = -3 \cdot 2^x - 2$
26. $-2 \cdot \left(\frac{1}{3}\right)^x + 3$
27. 3 , ∞
28. ∞ , -1
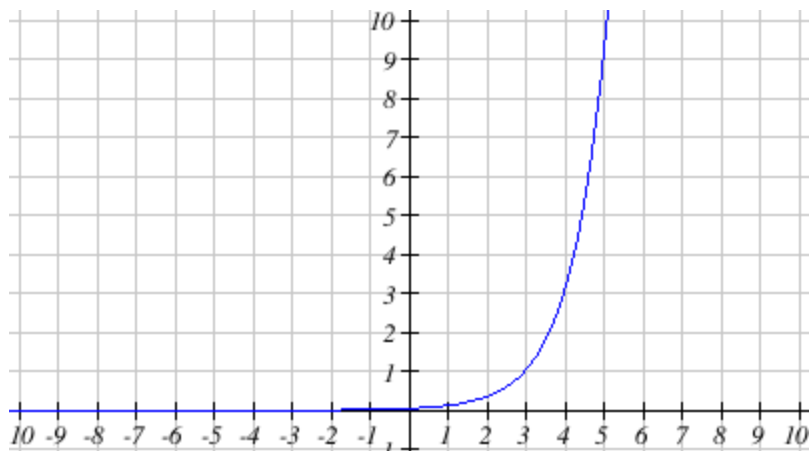
29.
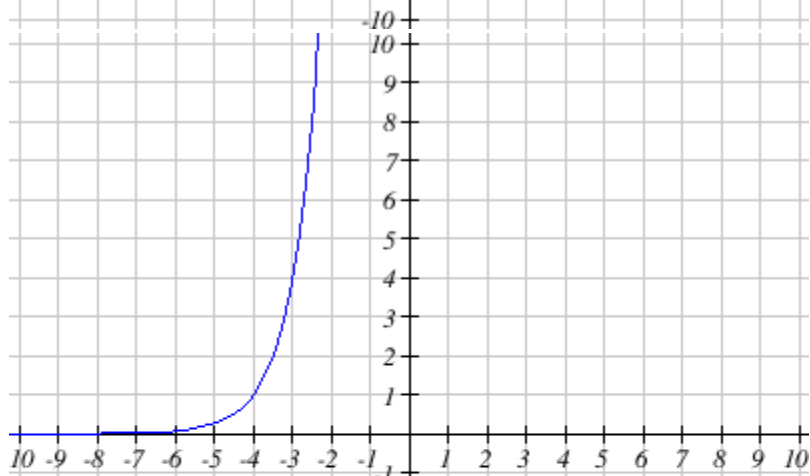
30.
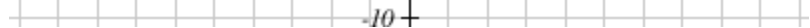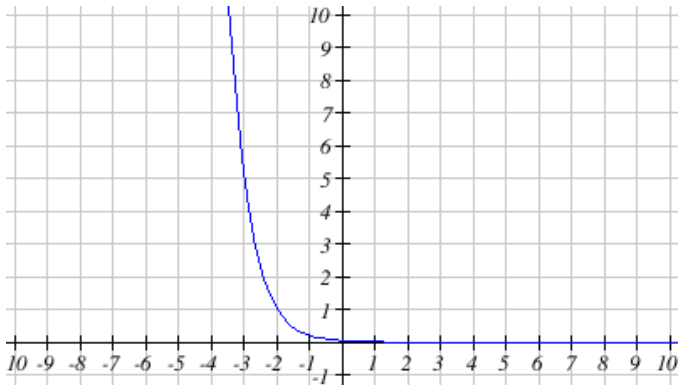
31.
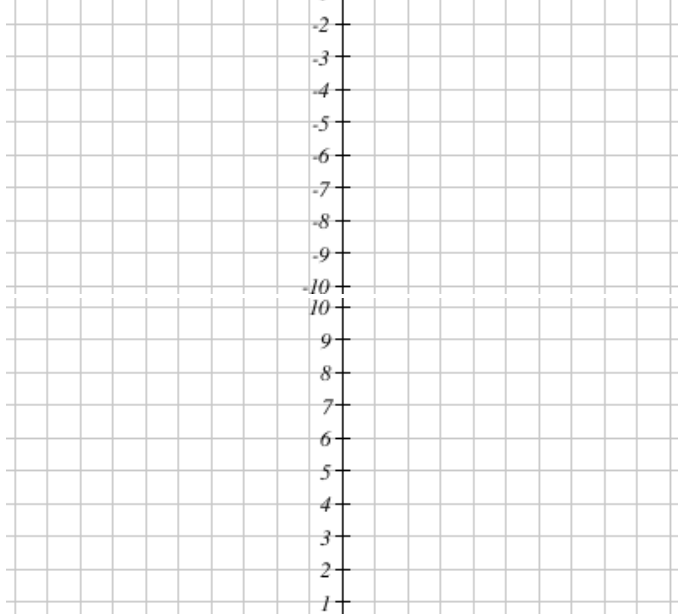
32.

33. 52 , $y = 20$,

34. -4

35. $\frac{4}{5}$

36. 4

37. $\frac{2}{5}$

38. -7

39. 0

40. -4

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Lecture 21 Answers

1. 20.0855 ,   0.2276
2. 13 ,   40
3. 64 ,   10
4. $-\dfrac{3}{4}$
5. exponential decay
6. exponential growth
7. 7312.1564832668 ,   7458.1799602672 ,   7492.8078533849 ,   7510.4423170574
8. 2500 ,   0.022 ,   4 ,   2,915.00 ,

    $\left(1 + \dfrac{0.022}{4}\right)^4 - 1 = 0.0221822 = 2.218\%$
9. $15400 \cdot e^{0.08 \cdot t}$,   29205
10. 336 ,   1.2214027581602
11. $178(2.305)^t$
12. 25 ,   960 ,   3350.7292391634
13. 7 ,   -33 ,   21.9 ,   -5.6 ,   17
14. 6299.6052494744 ,   163840000
15. 167.265321155
16. 64010.36
17. 45.947934199881
18. 78 ,   53

++++++++++++++
Lecture 22 Answers

1. $y^b = m$
2. $10^c = s$
3. $\log_9(n) = r$
4. $\log(v) = c$
5. 3, 8, 2, 25
6. 4, $\frac{1}{2}$, 2, 2, -2, $\frac{1}{4}$
7. 4, x, x, 3
8. $\log_3(81) = 4$, $\log(0.001) = -3$
9. $\ln(8) = x$, $\ln(x) = 5$
10. $343^{\frac{1}{3}} = 7$
11. 3
12. -1
13. -1
14. -5
15. -5, 3, $\sqrt{2}$, -5
16. -7, $\frac{2}{5}$, 5, 5, $\sqrt{3}$
17. 279936
18. $\frac{62}{5}$
19. $\frac{e^4-5}{5}$
20. $2^{\frac{8}{9}}$
21. $3^{4^{-3}}$
22. 9
23. 2
24. $\frac{1}{5}$
25. 4
26. -5
27. 12, 5, 5, 4
28. -42
29. -2, 4, 1, n
30. 2.8325089127062
31. $x = 4$
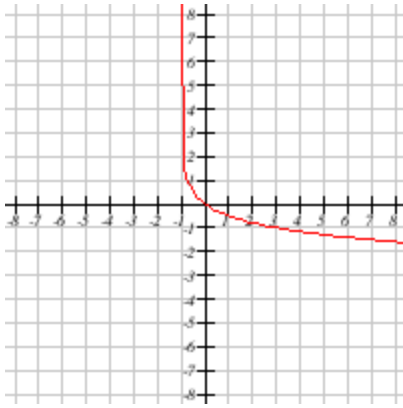
32.

33. 10^x e^x $\log x$ $\ln x$

34. $(-\infty, 1)$

35. $(-\infty, -2) \cup (1, \infty)$

36. $(-\infty, -3) \cup (1, \infty)$

37. $\left(-\frac{5}{2}, \infty\right), \quad (-\infty, \infty)$

38. 3

39. 2.5118864315096E-13

40. 0.001 ,   0.00000031622776601684

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Lecture 23 Answers

- The expression is undefined

-
$$\log_b\left(\frac{1}{5}\right) = -\log_b(5)$$
$$\log_7(xy) = \log_7(x) + \log_7(y)$$
$$\log_2\left(\frac{x}{y}\right) = \log_2(x) - \log_2(y)$$

- all of the above

- 0

- N

- $\log(5) + \log(c) - \log(11)$

- $20\log(x) + 11\log(y) - 2\log(z)$

- $139\ln(x) - 41\ln(y)$

- $3 - \log_9(x - 3) - \log_9(x + 3)$

- $20\ln(w) + 8\ln(x) - \frac{1}{5}\ln(z + 2)$

- $2 + 15\log_3(x) + 8\log_3(y)$

- $\frac{1}{3}\left(3\log(y) + 11\log(w) - 10\log(x)\right)$

- 20.5 ,   -23 ,   -15

- 1.2852

- $\frac{5}{3}$, $\frac{5}{6}$, $-\frac{5}{6}$

- $f^{-1}(t) = \dfrac{\ln\left(\frac{t-6}{-5}\right)}{\ln 2}$

- $\log_3(5b^5)$

- $\log_3(b^2 + 5b)$

- $\log\left(\frac{7^3}{x^1}\right)$

- $\log_4(w^{20}x^5)$

- $\log_3\left(\dfrac{w^4 x^9}{\sqrt[2]{y+17}}\right)$

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Lecture 24 Answers

1. 1.5107

2. 8

3. 2

4. $\dfrac{1}{4}$

5. 5

6. 32.661183087588

7. 5.1

8. 6.9818990268351

9. $\dfrac{\log\left(\frac{18}{11}\right)}{\log\left(\frac{1.09}{1.12}\right)}$ or $\dfrac{\log(18)-\log(11)}{\log(1.09)-\log(1.12)}$, approximately -18.138436279487

10. $\dfrac{\log\left(\frac{20}{9}\right)}{\log\left(\frac{1.17}{1.09}\right)}$ or $\dfrac{\log(20)-\log(9)}{\log(1.17)-\log(1.09)}$, approximately 11.27420867405

11. $\ln(16) - \ln(4)$ or $\ln(4)$,   1.3863

12. $1250(0.81)^t$,   3.3

13. $\ln\left(\frac{5}{18}\right) - 5$ (preferred) or $\ln(5) - \ln(18) - 5$,   -6.2809

14. 10.127464398051

15. $\dfrac{\log(23)}{\log(4)}$ or $\log_4(23)$,   2.2618

16. $\dfrac{--1+\ln(13)}{4}$,   0.8912

17. $3\dfrac{\log(3)}{\log(4)}$,   2.3774

18. 403.4288

19. 16.0855

20. 4.7155

21. 200 ,   283 ,   18.9

22. No solution

23. $\dfrac{\ln\left(\frac{7}{10}\right)}{3\ln(4)}$

24. $\dfrac{10}{\ln(14)}$

25. $\dfrac{\ln(4)}{3}$

26. $\dfrac{\ln(36)}{\ln(3)}$

27. $\dfrac{2\ln(3)-4\ln(5)}{7\ln(5)-\ln(3)}$,   -0.42

28. $\dfrac{-3\ln(5)-5\ln(6)}{8\ln(6)-\ln(5)}$,   -1.08

29. $x = \log_7(6) + 9$ or $x = \dfrac{\ln(6)+9\ln(7)}{\ln(7)}$, $x \approx 9.9208$

30. 9

31. 1.8333333333333

32. 36

33. 4 ,   DNE

34. 1.0054299011128

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Lecture 25 Answers

1. 2.6979578961226
2. 15.1
3. 6.1559990403261
4. 25198.420997897 ,   163840000
5. 1600 ,   0.85 ,   4.3
6. 85
7. 129.3311
8. 5730
9. $60 + 70 \cdot e^{-0.2 \cdot t}$
10. 22 , $y = 21$,   The temperature of the coffee will eventually approach 21° Celsius
11. 6.9
12. 144 ,   52680 ,   575000
13. 13.5
14. 202 animals

++++++++++++++
Lecture 26 Answers

1. 1

2. $\frac{180}{\pi}$, 57.3 , $\frac{180}{\pi}x$, $\frac{720}{\pi}$, 229.18

3. 330

4. -210°

5. $\frac{2\pi}{3}$

6. $\frac{11\pi}{9}$, 80

7. 296

8. 79 , 235 , 135 , 39

9. $266 + 360k$

10. $\frac{-8\pi}{3}$, $\frac{4\pi}{3}$

11. 120 , -600

12. $\frac{\pi}{3}$

13. 42° , 89° , 30° , 37° , 84°

14. 145

15. $\frac{11}{36} \cdot \pi = 0.95993108859688$

16. 6

17. 35.81

18. 25069.909375647 , 23.740444484514

19. $\frac{11660\pi}{528}$

20. $\frac{45 \cdot \left(\frac{1}{60}\right) \cdot \left(\frac{1}{60}\right) \cdot \left(\frac{5280}{1}\right) \cdot \left(\frac{12}{1}\right)}{2 \cdot \pi \cdot (4.5+7.25)} = 10.727720419471$, 59.212765957447 , 28.212765957447

21. $\frac{145\pi}{3}$ ft/sec , 151.8 ft/sec , $\frac{725\pi}{22}$ mph , 103.5 mph

22. $\frac{1}{2} \cdot 10.9^2 \cdot 0.5 = 29.7025$

23. $\sqrt{\frac{2 \cdot 39}{\left(\frac{4}{5}\right) \cdot \pi}} = \sqrt{\frac{390}{4\pi}} = 5.5709257671342$

24. 378.30011536977

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Lecture 27 Answers

1. III , II , I , IV

2. $-\dfrac{2\sqrt{10}}{11}$

3. $-\dfrac{6\sqrt{2}}{11}$

4. $\dfrac{2\sqrt{30}}{13}$

5. $0,\ \dfrac{\pi}{6},\ \dfrac{\pi}{4},\ \dfrac{\pi}{3},\ \dfrac{\pi}{2},\ \dfrac{2\pi}{3},\ \dfrac{3\pi}{4},\ \dfrac{5\pi}{6},\ \pi,\ \dfrac{7\pi}{6},\ \dfrac{5\pi}{4},\ \dfrac{4\pi}{3},\ \dfrac{3\pi}{2},\ \dfrac{5\pi}{3},\ \dfrac{7\pi}{4},\ \dfrac{11\pi}{6}$

6. 0 , 30 , 45 , 60 , 90 , 120 , 135 , 150 , 180 , 210 , 225 , 240 , 270 , 300 , 315 , 330
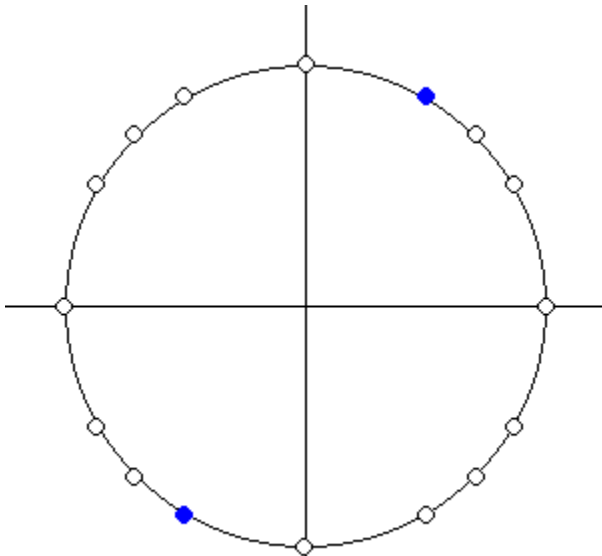
7.
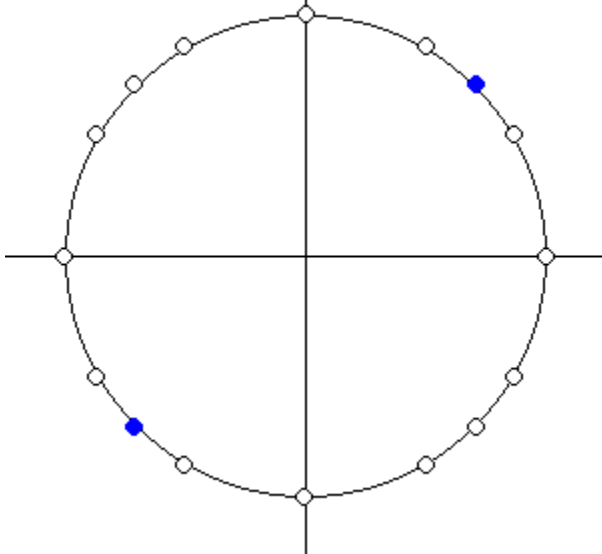
8.

9.
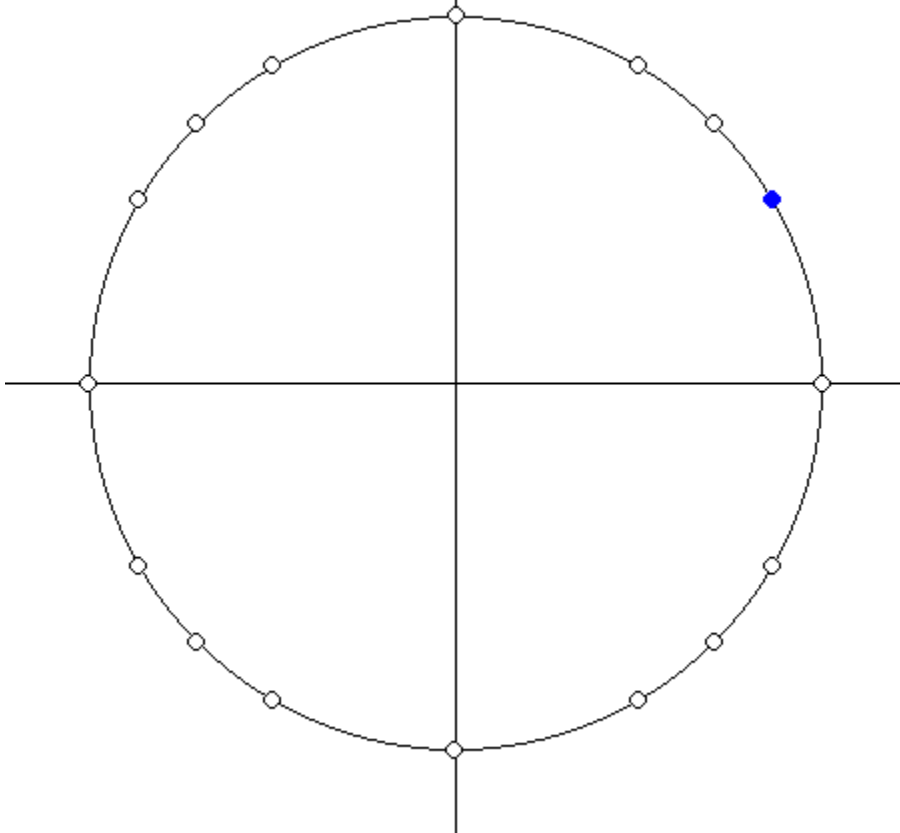
10.

11. 300

12. $-\dfrac{\sqrt{2}}{2}$, $\quad -\dfrac{\sqrt{2}}{2}$, $\quad \dfrac{\sqrt{2}}{2}$, $\quad \dfrac{\sqrt{2}}{2}$, $\quad \dfrac{1}{2}$, $\quad \dfrac{\sqrt{3}}{2}$

13. 0.86602540378444
14. 1
15. 0.70710678118655
16. 1
17. 1
18. 2
19. $\sqrt{3}$
20. 120 , 300
21. 320 , 140
22. 1

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Lecture 28 Answers

1. 47 ,   33 ,   37

2. 1.2566370614359 ,   0.3 ,   1.2566370614359

3. 52°

4. 1.0471975511966

5. $\frac{1}{2}$, $\frac{\sqrt{3}}{2}$, $\frac{1}{\sqrt{3}}$,   2 , $\frac{2}{\sqrt{3}}$, $\sqrt{3}$
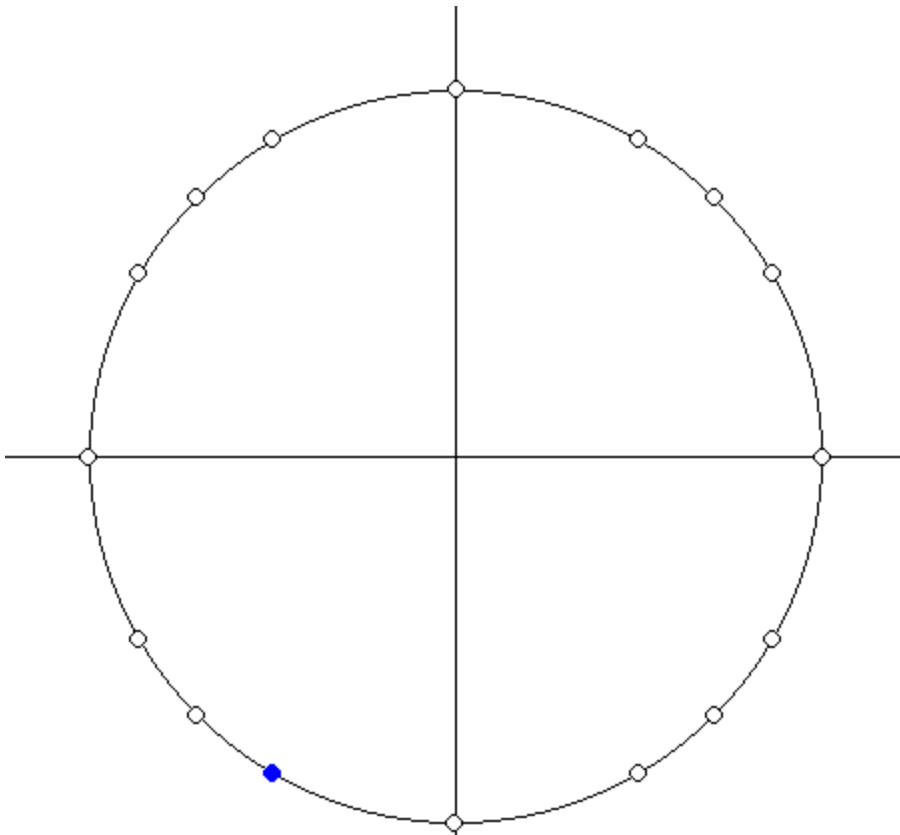
6. $\sqrt{3}$,   2 , $\frac{1}{\sqrt{2}}$

7. 0.45812284729085 ,   2.182820625327 ,   1.125 ,   1.9402850002907 ,
    0.51538820320221

8. $\frac{\sqrt{165}}{13}$, $\frac{2}{\sqrt{165}}$, $\frac{13}{2}$, $\frac{13}{\sqrt{165}}$, $\frac{\sqrt{165}}{2}$

9. 4 , $4 \cdot \sqrt{2} = 5.6568542494924$

10. $\frac{4\sqrt{41}}{41}$, $\frac{5\sqrt{41}}{41}$, $\frac{4}{5}$, $\frac{\sqrt{41}}{5}$, $\frac{\sqrt{41}}{4}$, $\frac{5}{4}$

11. 10.392304845413 ,   12 ,   60

12. 2.5881904510252 ,   9.6592582628907 ,   75

13. $\frac{120}{169} = 0.71005917159763$, $\frac{119}{169} = 0.70414201183432$, $\frac{120}{119} = 1.0084033613445$,
    $\frac{169}{119} = 1.4201680672269$, $\frac{169}{120} = 1.4083333333333$, $\frac{119}{120} = 0.99166666666667$

14. $\frac{7\sqrt{149}}{149}$, $\frac{10\sqrt{149}}{149}$, $\frac{7}{10}$, $\frac{\sqrt{149}}{10}$, $\frac{\sqrt{149}}{7}$, $\frac{10}{7}$

15. $\frac{88}{137} = 0.64233576642336$, $\frac{105}{137} = 0.76642335766423$, $\frac{88}{105} = 0.83809523809524$
    , $\frac{137}{105} = 1.3047619047619$, $\frac{137}{88} = 1.5568181818182$, $\frac{105}{88} = 1.1931818181818$

16. $\tan(35°) = \frac{91}{x_1}$ & $\tan(44°) = \frac{91}{x_2}$ & $x = x_1 + x_2 = 224.19472716847$

17. $\tan(26°) = \frac{97}{x_2}$ & $\tan(54°) = \frac{97}{x_1}$ & $x = x_2 - x_1 = 128.40484741667$

18. 31.606026899044

19. 287.75114919799

20. 5181.0201926006

21. 553.42614922892

22. 318.05916548197
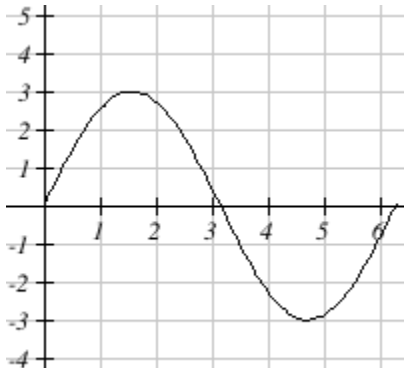
1.
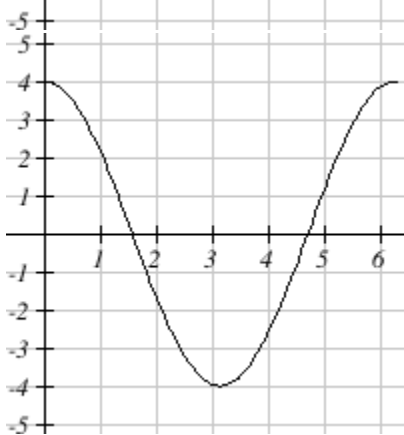
2.

3. $8 \cdot \sin(x - 5) - 8$

4. 6 ,   1.0471975511966

5. 2 ,   50.265482457437

6. 2 ,   5 ,   -2

7. 5 ,   0.78539816339745 ,   3 ,   Right ,   4

8. 5 ,   1.0471975511966 ,   7 ,   Right ,   3
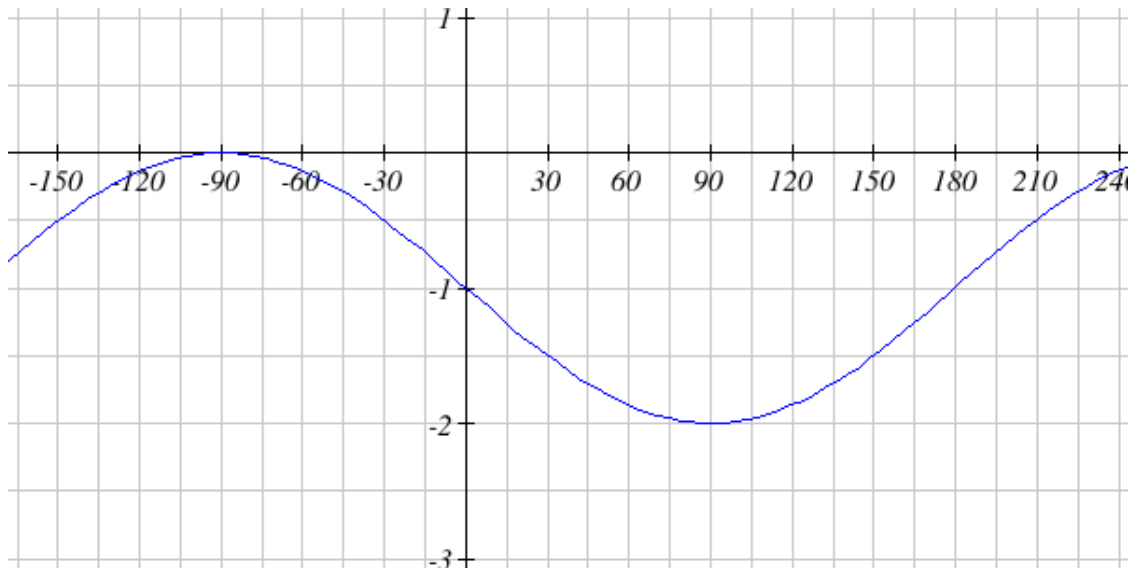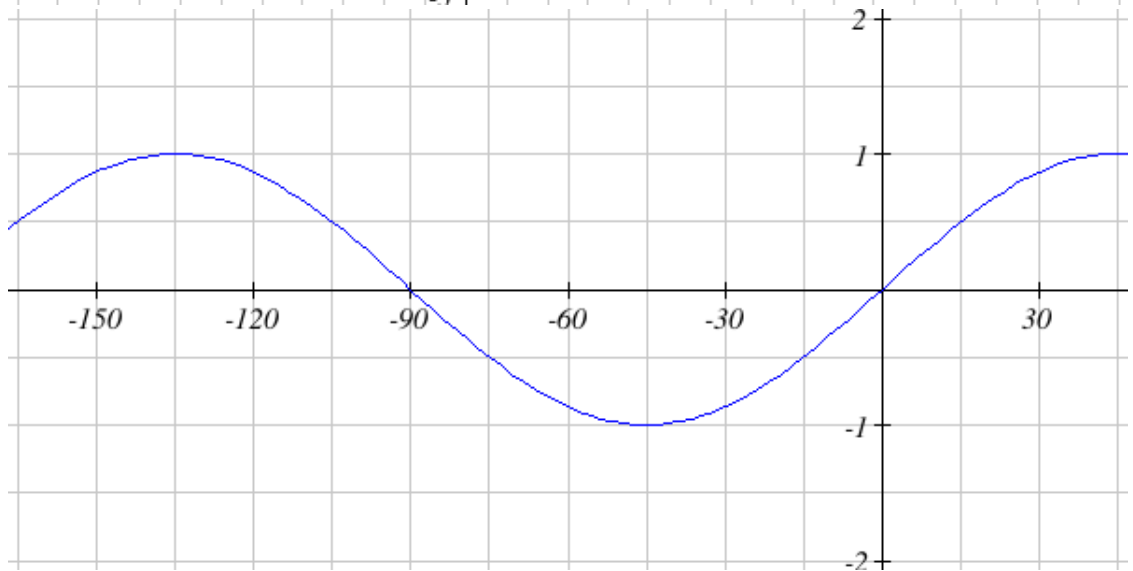
9. 5 ,   12 ,   2 ,   Left ,   3

10. $y = 4\sin\left(\frac{\pi}{3}x\right) + 1$

11. $y = 3\cos\left(\frac{\pi}{7}x\right) + 0$

12. $4\sin\left(\frac{\pi}{3}x\right)$

13.

14.
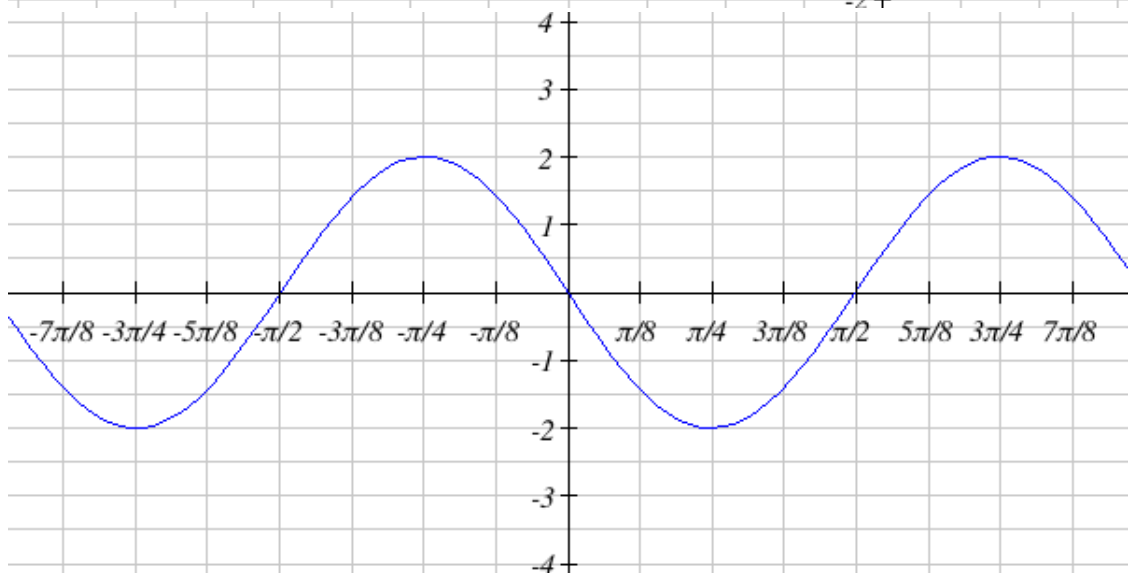
15.
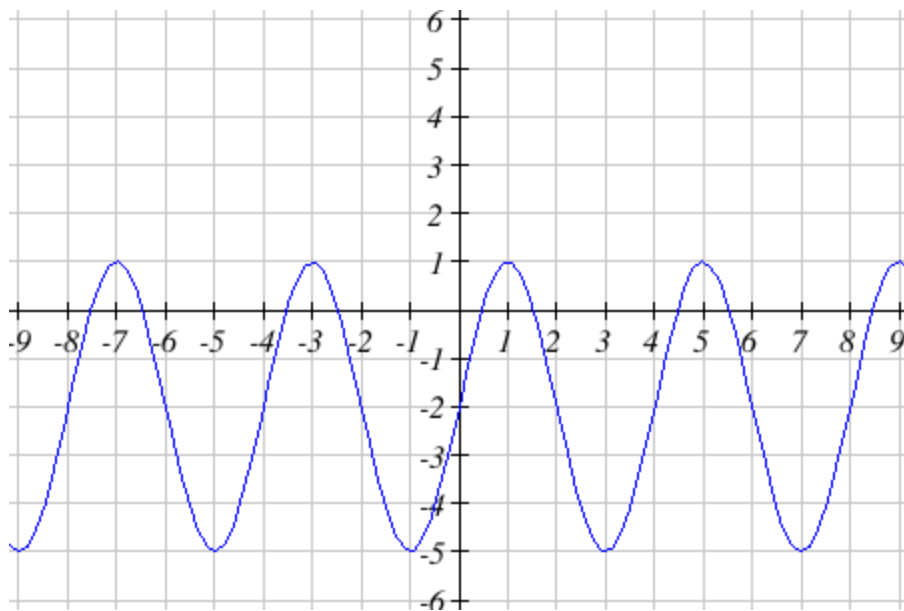
16.
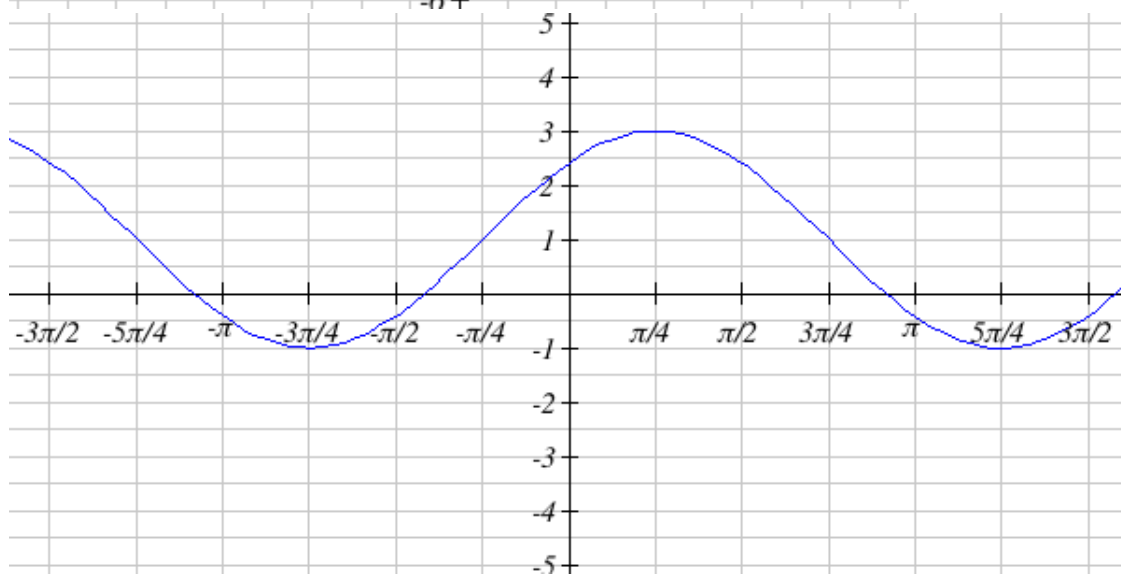
17.
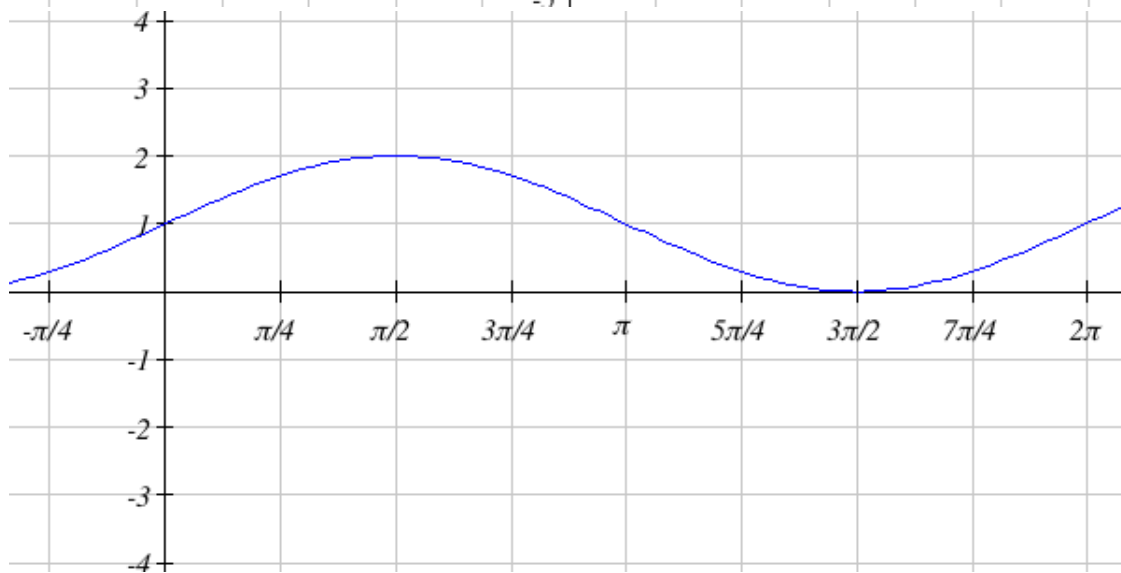
18.
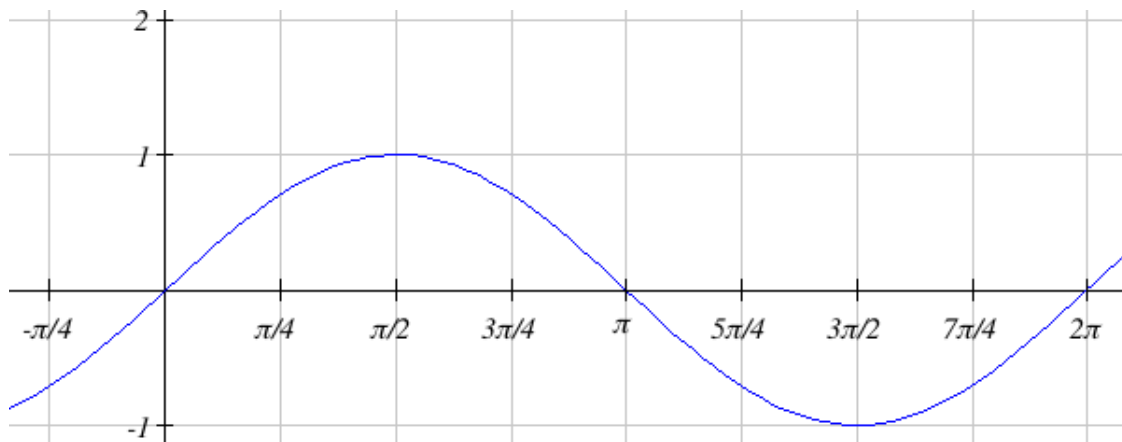
19.
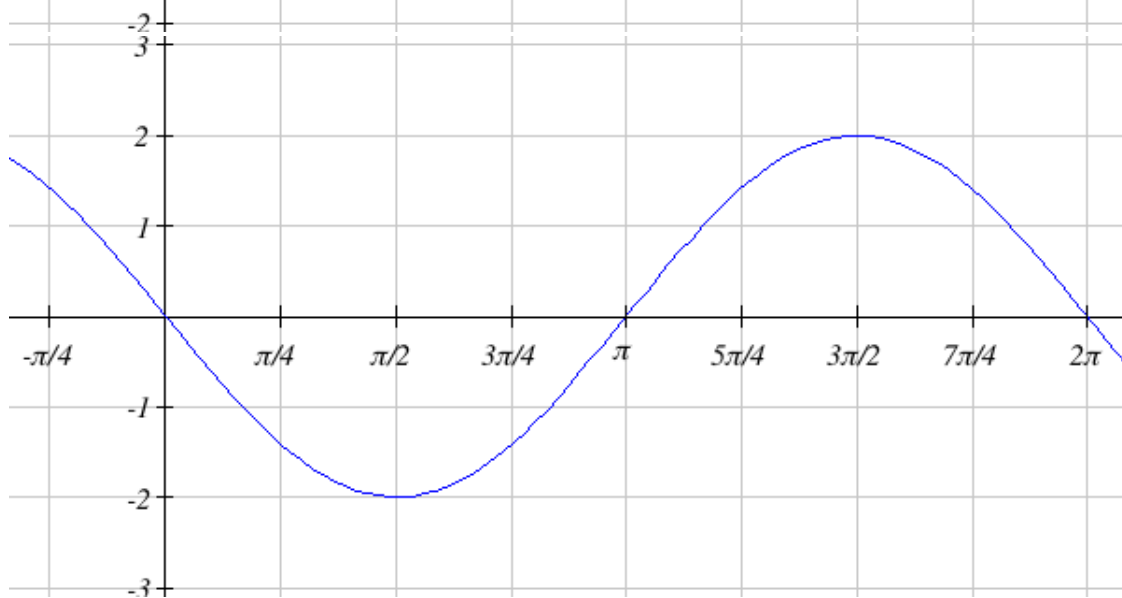
20.
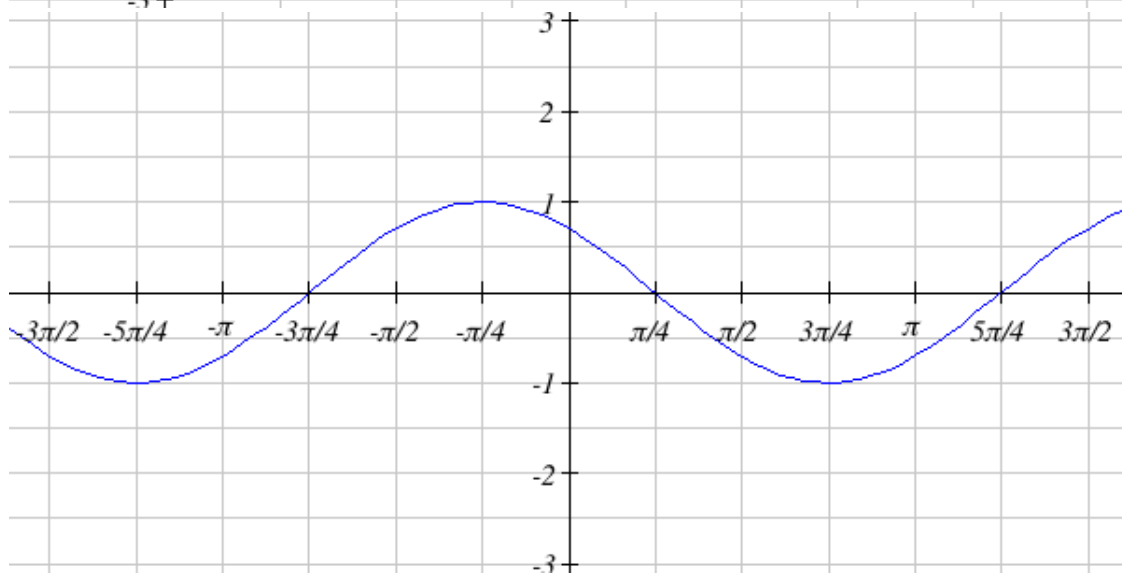
21.
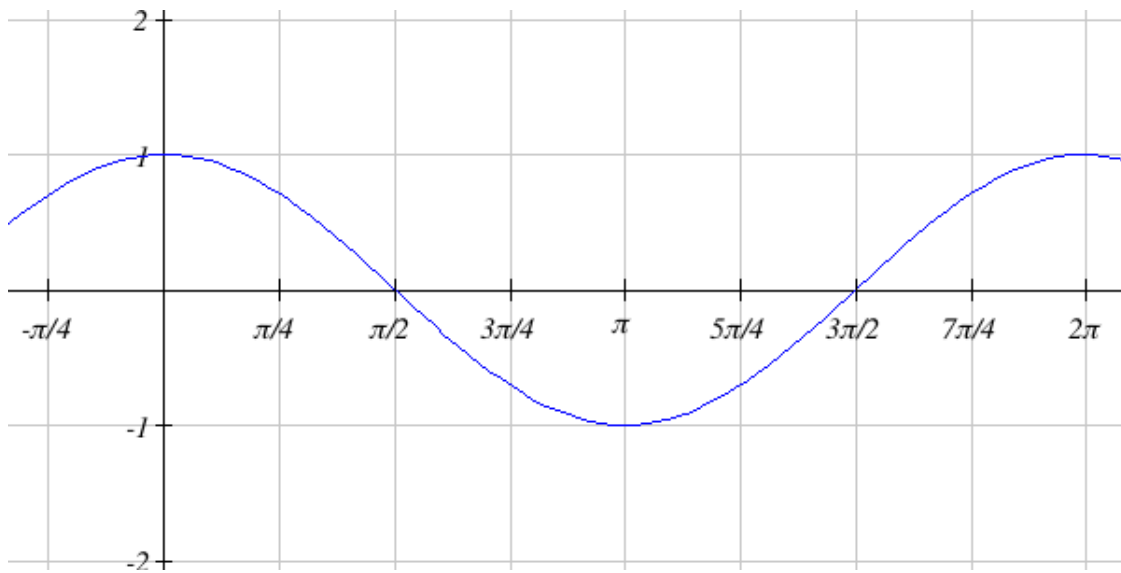
22.
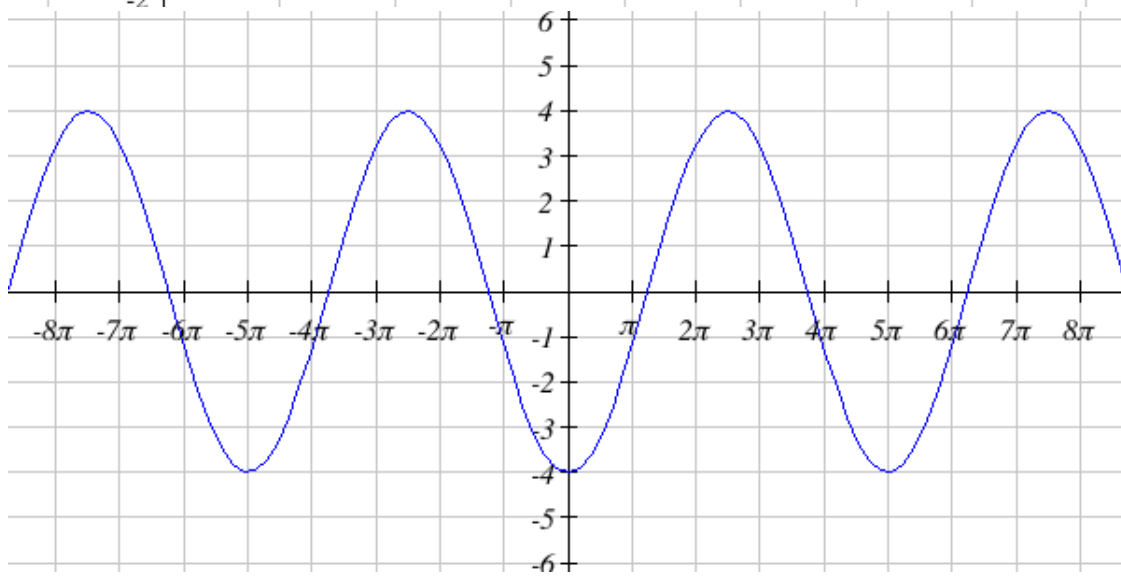
23.

24. $70 - 11 \cdot \sin\left(\frac{\pi}{12} \cdot t\right)$

25. 7.5 ,   11.5 ,   4 ,   19

26. $-15 \cdot \cos\left(\frac{\pi}{2} \cdot t\right) + 19$

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Lecture 30 Answers

1. $\frac{\pi}{2}, \frac{3\pi}{2}$

2. $\frac{\pi}{2}, \frac{3\pi}{2}, \quad 0, \pi$

3. y = csc(x)

4. y = tan(x)

5. e c a b

6. $\frac{5}{7}$

7. $\frac{16\pi}{5}$

8. $\frac{4}{9}$

9. $\frac{\pi}{3}, \quad 2, \quad$ Right

10. $\frac{2\pi}{3}, \quad 8, \quad$ Left

11. 3, 5, Left

12. $2\sec\left(\frac{2\pi}{5}x\right) + 1$

13. $2\tan(x) - 2$

14. $2\tan\left(\frac{\pi}{2}x\right)$

15. $f(x) = -4\tan\left(\frac{\pi}{4}x\right) - 1$

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Lecture 31 Answers

1. $-\dfrac{\pi}{2}$, $-\dfrac{\pi}{3}$, $\dfrac{\pi}{2}$

2. $\dfrac{\pi}{6}$, $\dfrac{\pi}{3}$, $\dfrac{5\pi}{6}$

3. $\dfrac{\pi}{4}$, $-\dfrac{\pi}{6}$, $\dfrac{\pi}{6}$

4. 0.95206763612265

5.
   Quadrant 3
   Quadrant 4 ,
   Quadrant 4

6.
   Quadrant 2
   Quadrant 3 ,
   Quadrant 2

7. b e d f

8. 0.6

9. DNE

10. $\dfrac{-3\pi}{7}$

11. $\dfrac{-5\pi}{12}$

12. $\dfrac{\pi}{4}$

13. $\dfrac{\pi}{4}$

14. -50

15. 1.3

16. $\dfrac{-4\pi}{9}$

17. 1

18. 63.434948822922

19. $\dfrac{\pi}{3}$

20. $\dfrac{\pi}{4}$

21. $\dfrac{\sqrt{8}}{3}$

22. $\dfrac{3}{\sqrt{9+a^2}}$

23. 20.56 ,   8.54 ,   8

24. $\dfrac{1}{\sqrt{y^2+1}}$

25. $\dfrac{\sqrt{1-x^2}}{x}$

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Lecture 32 Answers

1. 10.24695076596 ,   37.979872444852 ,   52.020127555148
2. 7.2801098892805 ,   74.054604099077 ,   15.945395900923
3. 1.819851171331 ,   5.3208888623796 ,   20
4. 1.2155372436685 ,   6.8936542710855 ,   80
5. 3.1058285412302
6. 12.557035741758
7. 60 ,   44
8. $\sin(62°) = \frac{37}{x_1}$ & $\sin(54°) = \frac{x_1}{x}$ & $x = 51.797542161485$
9. 421.85321760261
10. 359.15772250744
11. 218
12. $1(\sqrt{3} - \sqrt{2})$
13. 17,993,000
14. 61.6835
15. 4241
16. 234.68233955419

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Lecture 33 Answers

1. $\tan(t)$
2. $\cot(t)$
3. $\sec(t)$
4. $\csc(t)$
5. $\cot^2(t)$
6. 3 , -0.1 , 0.7 , -3.5
7. $-\csc(x)$
8. -1
9. 1
10. $\sin(x)$
11. 4 , 2
12. $\left(\cos(x)\right)^2$
13. $\csc(t)$
14. $\sec(u)\csc(u)$
15. $(2\sin(x) - 1)(\sin(x) - 1)$
16. $(2\sin(x) + 1)(\sin(x) - 1)$
17. $\dfrac{\sqrt{221}}{10}$
18. $7\sin(t)$, $7\cos(t)$
19. $2\tan(t)$, $2\sec(t)$
20. $5\sec(t)$, $5\tan(t)$

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Lecture 34 Answers

1. $\dfrac{\pi}{6}, \dfrac{5\pi}{6}$

2. $\dfrac{\pi}{4}, \dfrac{3\pi}{4}$

3. $\dfrac{5\pi}{4}, \dfrac{7\pi}{4}$

4. $\dfrac{\pi}{6}, \dfrac{11\pi}{6}$

5. $0.43344532006989 , \quad 2.7081473335199$

6. $1.2556032943542 , \quad 5.0275820128254$

7. $\dfrac{\pi}{3}, \dfrac{5\pi}{3}$

8. $\dfrac{\pi}{2} + k\pi$

9. $\dfrac{\pi}{2} + 2k\pi \quad$ or $\quad \dfrac{3\pi}{2} + k\pi , \quad$ any integer

10. $\dfrac{\pi}{4}, -\dfrac{3\pi}{4}$

11. $\dfrac{\pi}{4}, \dfrac{5\pi}{4}$

12. $\dfrac{7\pi}{6}, \dfrac{11\pi}{6}, \dfrac{3\pi}{2}$

13. $\dfrac{2\pi}{3}, \dfrac{4\pi}{3}, \pi , \quad$ k any integer

14. $0 + 2k\pi$

15. $\pi + 2k\pi \quad$ or $\quad -\pi + 2k\pi , \quad$ any integer

16. $2k\pi , \quad$ any integer

17. $\dfrac{\pi}{6}, \dfrac{5\pi}{6}, \dfrac{3\pi}{2}$

18. $\arctan(2), \pi + \arctan(2)$

19. REMOVED

20. $\dfrac{4\pi}{9}, \dfrac{5\pi}{9}, \dfrac{10\pi}{9}, \dfrac{11\pi}{9}, \dfrac{16\pi}{9}, \dfrac{17\pi}{9}$

21. $0,60,120,180,240,300$

22. $105,165,285,345$

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Lecture 35 Answers

1. 1 , 1
2. 8 , 3
3. $\sin(x) + 1$
4. $\cos(t)$
5. $\csc^2(t)$
6. $\cos(y)$
7. $\dfrac{-\cos(x)\big(1+\sin(x)\big)+\cos(x)\big(1-\sin(x)\big)}{\big(1-\sin(x)\big)\big(1+\sin(x)\big)}$, $\quad -\dfrac{2\cdot\cos(x)\cdot\sin(x)}{1-\big(\sin(x)\big)^2}$, $\quad -\dfrac{2\cdot\cos(x)\cdot\sin(x)}{\big(\cos(x)\big)^2}$, $\quad -\dfrac{2\cdot\sin(x)}{\cos(x)}$

8. $\left(\dfrac{1}{\sin(y)}+\dfrac{\cos(y)}{\sin(y)}\right)^2$, $\quad \left(\dfrac{1+\cos(y)}{\sin(y)}\right)^2$, $\quad \dfrac{\big(1+\cos(y)\big)^2}{1-\big(\cos(y)\big)^2}$, $\quad \dfrac{\big(1+\cos(y)\big)^2}{\big(1-\cos(y)\big)\big(1+\cos(y)\big)}$

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Lecture 36 Answers

1. $\dfrac{\sqrt{2}(\sqrt{3}-1)}{4}$

2. $\dfrac{\sqrt{3}-1}{\sqrt{3}+1}$

3. $\dfrac{\sqrt{2}(\sqrt{3}+1)}{4}$

4. $\dfrac{\sqrt{6}-\sqrt{2}}{4}$

5. $\dfrac{-\sqrt{2}-\sqrt{6}}{4}$

6. 3 , 3

7. 3 , 1

8. $\cos\left(\dfrac{\pi}{3}\right)$, $\dfrac{1}{2}$

9. 60 , 3

10. 0.9767723601892 , -0.0999782589887

11. 0.62355231421471 , -0.47844562643891

12. 0.49602955009942 , 0.97502764055992

13. 0.65763229981288

14. -0.59191518831923

15. 3.25

16. $\dfrac{189}{\sqrt{14^2+5^2}\cdot\sqrt{11^2+7^2}}$

17. $\dfrac{1}{2}\sin(x) + \dfrac{\sqrt{3}}{2}\cos(x)$

18. $\cos(x)$

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Lecture 37 Answers

1. $2\sin(x)\cos(x)$, $\cos^2(x) - \sin^2(x)$ or $2\cos^2(x) - 1$ or $1 - 2\sin^2(x)$, $\frac{2\tan(x)}{1-\tan^2(x)}$

2. $\cos(2 \cdot 15)$, $\frac{\sqrt{3}}{2}$

3. 58, $6x$

4. $-\frac{\sqrt{2-\sqrt{3}}}{2}$

5. $\frac{\sqrt{2-\sqrt{3}}}{2}$

6. $\frac{4896}{21025}$, $-\frac{20447}{21025}$

7. $\frac{119}{169}$

8. $-\frac{24}{25}$

9. $-\frac{9}{40}$

10. $\sqrt{\frac{1}{2}\left(1+\frac{2}{\sqrt{13}}\right)}$, $\sqrt{\frac{1}{2}\left(1-\frac{2}{\sqrt{13}}\right)}$, $\sqrt{\frac{\sqrt{13}-2}{\sqrt{13}+2}}$

11. $-\frac{15}{17}$

12. $-\sqrt{\frac{11}{18}}$

13. $\sqrt{\frac{17}{18}}$

14. $\sqrt{\frac{25}{26}}$

15. $-\sqrt{\frac{49}{50}}$

16. $\frac{612}{613}$

17. $\frac{12\sqrt{5}}{49}$

18. $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{3\pi}{2}$

19. $0, \frac{2\pi}{3}, \frac{4\pi}{3}$

20. $\frac{\pi}{2}, \frac{3\pi}{2}, \frac{\pi}{6}, \frac{5\pi}{6}$

21. DNE

22. $\frac{\pi}{2}, \frac{3\pi}{2}$

23. 0

24. $\frac{\pi}{2}$

25. $\dfrac{2\pi}{3}, \dfrac{4\pi}{3}$

26. $-\sin(t)$

27. $\dfrac{2\sin(b)\cos(b)}{1-2\left(\sin(b)\right)^2-1}$, $\dfrac{\sin(b)\cos(b)}{-\left(\sin(b)\right)^2}$, $\dfrac{\cos(b)}{-\sin(b)}$, $\dfrac{1}{-\tan(b)}$