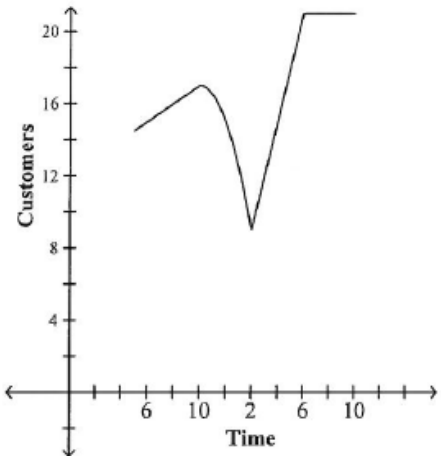
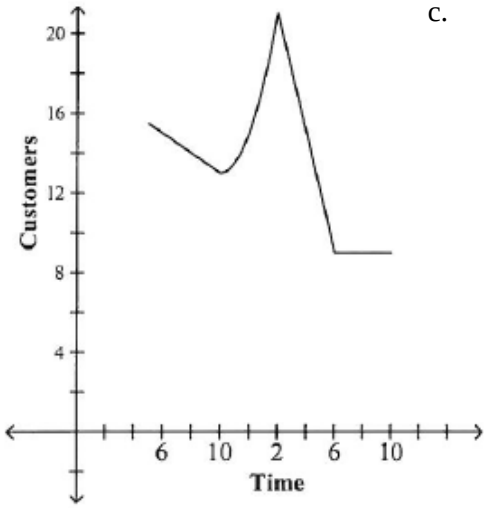
Chapter 6

1. A restaurant had a lot of customers for breakfast and dinner, but not many customers for lunch. Which graph best represents the number of customers in the restaurant that day?

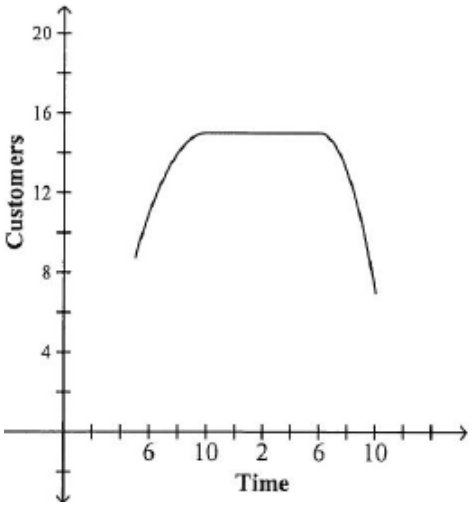
a.



b.



c.



2. Describe the end behavior of each function, as $x \to +\infty$ and $x \to -\infty$.

a) $P(x) = 18x^6$ b) $P(x) = -3x^5$

3. Evaluate $f(-3)$, if $f(x) = \begin{cases} 5x^3 - 2, & \text{if } x < -6 \\ 3x^2 - 2, & \text{if } -6 \le x < 7 \\ 7 + 2x, & \text{if } x \ge 7 \end{cases}$

4. Given: $f(x) = \begin{cases} 2x^2 + 1, & \text{if } x > 0 \\ -x + 1, & \text{if } x \le 0 \end{cases}$. Write a rule for $g(x)$, whose transformation is described.

a) a horizontal translation of $f(x)$ 4 units left

b) a vertical translation of $f(x)$ 5 units up

c) a vertical stretch of $f(x)$ by a factor of 3

5. Given $f(x) = 2x^2 + 8x - 4$ and $g(x) = -5x + 6$, find $(f - g)(x)$.

6. Given $f(x) = 4x^2 + 3x - 5$ and $g(x) = -2x + 12$, find $(fg)(x)$.

7. Given $f(x) = x^3$ and $g(x) = 4x + 3$, find $g(f(3))$.

8. Find the inverse of $f(x) = (3x - 24)^4$. Determine whether the inverse is a function, and state the domain and range of the inverse.

Chapter 7

9. You are eating dinner at a restaurant that offers 6 appetizers, 12 entrées, 6 side orders, and 8 desserts on its menu. If you choose one appetizer, one entrée, one side order, and one dessert, how many different ways can you order?

10. There are 7 singers competing at a talent show. In how many different ways can the singers appear?

11. You are asked to select 3 novels from a list of 10 to read. How many ways can you choose the 3 novels?

12. Fifteen students enter an essay contest. How many ways can 1^{st}, 2^{nd}, 3^{rd}, and 4^{th} places be awarded?

13. An experiment consists of rolling 2 cubes numbered 1-6. What is the probability the sum is odd and less than 6?

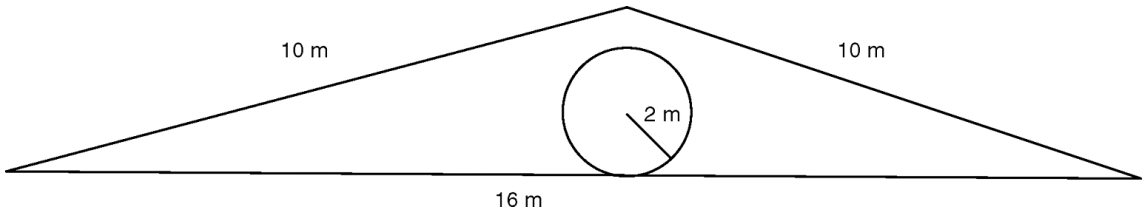
14. A person is selected at random. What is the probability the person was not born on Monday?

15. Of eleven persons attending a conference, 4 are executives and 6 are women. Three of the executives are women. One of the eleven attendees is selected at random. Find the probability that the person selected is an executive or a woman.

16. In a recent survey of 250 voters, 170 favor a new city regulation and 80 oppose it. What is the probability that in a random sample of 6 respondents from this survey, exactly 2 favor the proposed regulation and 4 oppose it? Express your answer as a decimal rounded to the nearest thousandth.

17. What is the probability that a card drawn at random from a standard 52-card deck is red and a face card?

18. Use the diagram to find the probability that a randomly selected point is in the triangle but not in the circle. Round the answer to the nearest hundredth.



19. A jar contains 4 red marbles, 2 blue marbles, and 6 green marbles.
a) Find the probability of choosing a red or a blue marble.
b) Find the probability of choosing a red marble and then a green marble, without replacement.
c) Find the probability of choosing a blue marble and then a red marble, with replacement.

20. In a survey, 3510 drivers were asked if they were color-blind (CB). The results of this survey are shown in the table.
a. What is the probability that a driver was color-blind, given that the driver was male?
b. What is the probability that a randomly selected driver was color-blind?

	Male	Female	Total
Not CB	1853	1554	3407
CB	97	6	103
Total	1950	1560	3510

21. A poll of 100 senior citizens in a retirement community asked about the types of electronic communication they used. The table shows the joint and marginal frequencies from the poll results. Given that one of the senior citizens polled uses text messaging, what is the probability that the person is also using e-mail? Round answer to the nearest hundredth.

		Uses text messaging		
		Yes	No	Total
Uses e – mail	Yes	0.17	0.66	0.83
	No	0.11	0.06	0.17
	Total	0.28	0.72	1

Chapter 9

22. Find the first 5 terms of the sequence with $a_1 = 6$ and $a_n = 2a_{n-1} - 1$.

23. Find the first 5 terms of the sequence $a_n = 2^n - 5$.

24. Write an explicit rule for the *n*th term of the sequence 23.1, 20.2, 17.3, 14.4, . . .

25. A small island in the middle of a river is eroding away. Each year, the island has 85% of the area from the previous year. After one year the island has an area of 10,200 square yards. How much of the island is left after 6 years?

26. Write the series $-\frac{1}{2} + \frac{1}{4} - \frac{1}{6} + \frac{1}{8} - \frac{1}{10} + \frac{1}{12}$ in summation notation.

27. Write the series $5 + 1 - 3 - 7 - 11 - 15 - 19$ in summation notation.

28. Find the 42nd term of the arithmetic sequence -5, -9, -13, -17, -21, . . .

29. Find the 5th term of an arithmetic sequence with $a_7 = 25$ and $a_{13} = 55$.

30. Find the sum for the arithmetic series $\sum_{k=1}^{13} 15k - 4$.

31. Find S_{50} for the series $3 + 9 + 15 + 21 + \ldots$

32. Find the 9th term of the geometric sequence -4, 12, -36, 108, . . .

33. Find the 9th term of the geometric sequence with $a_3 = 16$ and $a_5 = 64$.

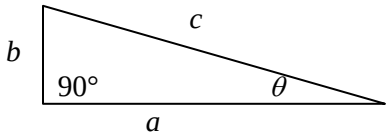
34. Find S_8 for the geometric series 7 + 0.7 + 0.07 + 0.007 + . . . Round answer to the nearest hundredth.

35. Find the sum of the infinite geometric series $2 + 1 + 0.5 + 0.25 + \ldots$

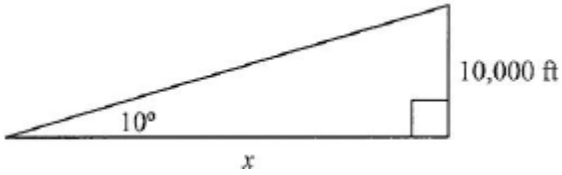
36. Find the first 3 terms of the geometric sequence with $a_6 = -128$ and $a_{11} = 4096$.

Chapter 10

37. Find the values for the six trigonometric functions for θ where $a = 96$ and $b = 28$ in simplest form.



38. After takeoff from an airport, the airplane's angle of ascent is 10°. The airplane climbs to an altitude of 10,000 feet. At that point, what is the land distance between the airplane and the airport? Round the answer to the nearest foot.



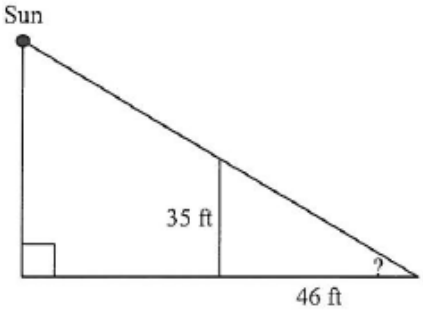
39. A surveyor whose eye level is 5 feet above the ground determines the angle of elevation to the top of an office building to be 41.7°. If the surveyor is standing 40 feet from the base of the building, what is the height of the building to the nearest foot?

40. Convert $\frac{17\pi}{10}$ to degrees.

41. Convert -35° to radians.

42. Find the exact value of a) cos 210° b) sin 300° c) tan 135°

43. A 35-foot telephone pole casts a 46-foot shadow on the ground while the sun is shining. To the nearest degree, what is the angle of elevation of the sun from the end of the shadow?



44. Solve ΔMNP, if $\angle N = 118°$, $\angle P = 33°$, and $m = 15$. Round to the nearest tenth.

45. Solve ΔABC, if $a = 28$, $b = 23$, $c = 17$. Round to the nearest tenth.

46. Solve ΔABC if $\angle A = 60°$, $b = 33$, $c = 15$. Round to the nearest tenth.

Chapter 12

47. Identify the conic, rewrite in standard form, and find the center.

a) $9x^2 + 25y^2 + 36x - 150y + 36 = 0$ b) $x^2 + y^2 - 12x + 4y + 31 = 0$ c) $x^2 - y^2 + 10x = 0$

48. Find the vertex, focus, and directrix of each parabola.

a) $4y^2 = -8x$ b) $(x-2)^2 = 12(y+5)$

49. Write the equation of a parabola in standard form

a) with directrix $y = -5$ and focus (-4, -1) b) with directrix $x = 2$ and vertex (-1, 0)

50. Graph the ellipse $\frac{(x-6)^2}{100}+\frac{(y+5)^2}{64}=1$. Identify center, vertices, co-vertices, and foci.

51. Graph the hyperbola $\frac{(y-1)^2}{25}-\frac{(x-2)^2}{9}=1$. Identify center, vertices, and foci.

52. Determine the center and radius of the circle $(x+9)^2+(y-6)^2=48$.

53. Graph the parabola $x+2=\frac{-1}{8}y^2$. Identify and locate vertex, axis of symmetry, focus, and directrix. State the domain and range.

54. Rewrite the parabola $x^2-6x+8y-7=0$ in standard form. Graph it. Identify and locate the vertex, axis of symmetry, focus, and directrix. State the domain and range.

55. Solve each system of equations.

a) $\begin{cases} x^2+y^2=25 \\ y+5=\frac{1}{2}x^2 \end{cases}$ b) $\begin{cases} 3x^2+2y^2=17 \\ 4x^2+3y^2=24 \end{cases}$

56. Two balls are rolling on a tabletop. The path of one ball can be modeled by the equation $x^2+4y^2=7$. The path of the other ball can be modeled by the equation $2y^2-x=4$. Find the coordinates where the paths intersect.

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Chapter 9 Formulas

arithmetic sequence $a_n=a_1+(n-1)d$ $S=n\left(\frac{a_1+a_n}{2}\right)$

geometric sequence $a_n=a_1\cdot r^{n-1}$ $S=a_1\left(\frac{1-r^n}{1-r}\right)$

infinite geometric series sum $S=\frac{a_1}{1-r}$

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Chapter 12 Standard Conic Forms

circle $(x-h)^2+(y-k)^2=r^2$

parabolas $y-k=\frac{1}{4p}(x-h)^2$ $x-h=\frac{1}{4p}(y-k)^2$

ellipses $\frac{(x-h)^2}{a^2}+\frac{(y-k)^2}{b^2}=1$ $\frac{(x-h)^2}{b^2}+\frac{(y-k)^2}{a^2}=1$

hyperbolas $\frac{(x-h)^2}{a^2}-\frac{(y-k)^2}{b^2}=1$ $\frac{(y-k)^2}{a^2}-\frac{(x-h)^2}{b^2}=1$

Answers

1.a 2.a) as $x\to+\infty$ or $x\to -\infty$, $P(x)\to+\infty$ b) as $x\to-\infty$, $P(x)\to+\infty$ and as $x\to+\infty$, $P(x)\to -\infty$

3. 25 4a) $g(x)=\begin{cases}2(x+4)^2+1, \text{ if } x>-4\\ -x-3, \text{ if } x<-4\end{cases}$ b) $g(x)=\begin{cases}2x^2+6, \text{ if } x>0\\ -x+6, \text{ if } x\le 0\end{cases}$

c) $g(x)=\begin{cases}6x^2+3, \text{ if } x>0\\ -3x+3, \text{ if } x\le 0\end{cases}$ 5. $2x^2+13x-10$ 6. $-8x^3+42x^2+46x-60$ 7. 111

8. $y=8\pm\frac{\sqrt[4]{x}}{3}$, inverse not a function, D: $x\ge 0$,R: all real numbers 9. 3,456 10. 5,040

11. 120 12. 32,760 13. $\frac{1}{6}$ 14. $\frac{6}{7}$ 15. $\frac{7}{11}$ 16. 0.005 17. $\frac{3}{26}$

18. 0.74 19. a) $\frac{1}{2}$ b) $\frac{2}{11}$ c) $\frac{1}{18}$ 20.a) $\frac{97}{1950}$ b) $\frac{103}{3510}$ 21. 0.61

22. 6, 11, 21, 41, 81 23. -3, -1, 3, 11, 27 24. $a_n=-2.9n+26$ 25. ≈4,526 yd^2

26. $\sum_{k=1}^{6}\frac{(-1)^k}{2k}$ 27. $\sum_{k=1}^{7}9-4k$ 28. -169 29. 15 30. 1313 31. 7,500

32. -26,244 33. 1,024 34. 7.78 35. 4 36. 4, -8, 16 37. $\sin\theta=\frac{7}{25}$, $\cos\theta=\frac{24}{25}$,

$\tan\theta=\frac{7}{24}$, $\csc\theta=\frac{25}{7}$, $\sec\theta=\frac{25}{24}$, $\cot\theta=\frac{24}{7}$ 38. 56,713 ft 39. 41 ft 40. 306°

41. $\frac{-7\pi}{36}$ 42.a) $\frac{-\sqrt{3}}{2}$ b) $\frac{-\sqrt{3}}{2}$ c) -1 43. 37° 44. $\angle M\approx 29°, p\approx 16.9, n\approx 27.3$

45. $\angle C\approx 37.3°, \angle B\approx 55.1°, \angle A\approx 87.6°$ 46. $a\approx 28.6, \angle C\approx 27.0°, \angle B\approx 93.0°$

47.a) ellipse, $\frac{(x+2)^2}{25}+\frac{(y-3)^2}{9}=1$, C(-2, 3) b) circle, $(x-6)^2+(y+2)^2=9$, C(6, -2)

c) hyperbola, $\frac{(x+5)^2}{25}-\frac{y^2}{25}=1$, C(-5, 0) 48.a) V(0, 0) , F$\left(\frac{-1}{2},0\right)$, d: $x=\frac{1}{2}$

b) V(2, -5), F(2, -2), d: $y=-8$ 49.a) $y+3=\frac{1}{8}(x+4)^2$ b) $x+1=\frac{-1}{6}y^2$

50. C(6, -5), V(16, -5) (-4, -5), Co-V(6, 3) (6, -13), F(12, -5) (0, -5)

51. C(2, 1), V(2, 6) (2, -4), F$\left(2, 1\pm\sqrt{34}\right)$ 52. C(-9, 6), $r=4\sqrt{3}$

53. V(-2, 0), axis $y=0$, F(-4, 0), d: $x=0$, D: $x\le -2$, R: all real numbers

54. $y-2=\frac{-1}{8}(x-4)^2$, V(4, 2), axis $x=4$, F(4, 0), d: $y=4$, D: all real numbers, R: $y\le 2$

55. a) (0, -5) $(\pm 4, 3)$ b) $\left(\pm\sqrt{3}, 2\right), \left(\pm\sqrt{3}, -2\right)$ 56. $\left(-1, \frac{\pm\sqrt{6}}{2}\right)$