MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Select from the list of numbers all that belong to the specified set.

1) Integers
11, $\sqrt{7}$, -17, 0, $\frac{0}{6}$, $\sqrt{9}$

A) 11, 0, $\sqrt{9}$  
B) 11, -17, 0, $\frac{0}{6}$, $\sqrt{9}$  
C) 11, 0  
D) 11, -17, 0

Answer: B

2) Natural numbers
2, $\sqrt{7}$, -9, 0, $\frac{0}{25}$, $\sqrt{25}$

A) 2, 0  
B) 2, $\sqrt{25}$  
C) 2, 0, $\sqrt{25}$  
D) 2, 0, $\frac{0}{4}$

Answer: B

3) Real numbers
7, $\sqrt{6}$, -9, 0, $\frac{0}{2}$, $\sqrt{25}$, $\frac{-7}{0}$

A) 7, -9, 0, $\frac{0}{2}$, $\frac{-7}{0}$  
B) 7, -9, 0, $\frac{0}{2}$, $\sqrt{25}$  
C) 7, -9, 0, $\sqrt{25}$  
D) 7, $\sqrt{6}$, -9, 0, $\frac{0}{2}$, $\sqrt{25}$

Answer: D

4) Rational numbers
8, $\sqrt{5}$, -16, 0, $\frac{0}{7}$, $\sqrt{4}$, $\frac{-5}{0}$, 0.1

A) 8, -16, 0, $\frac{0}{7}$, $\sqrt{4}$, 0.1  
B) $\sqrt{5}$, $\sqrt{4}$  
C) $\sqrt{5}$, $\frac{0}{7}$, 0.1  
D) 8, 0, $\sqrt{4}$

Answer: A

5) Irrational numbers
1, $\sqrt{5}$, -7, 0, $\frac{0}{2}$, $\sqrt{25}$, $\frac{-4}{0}$, 0.18

A) $\sqrt{5}$, $\sqrt{25}$, 0.18  
B) $\sqrt{5}$, $\sqrt{25}$  
C) $\sqrt{5}$, $\frac{-4}{0}$  
D) $\sqrt{5}$

Answer: D

6) Rational numbers
-4, $0.6 \times 10^6$, $\sqrt{8}$, 8.3, 2, $0.\overline{66}$

A) -4, $0.6 \times 10^6$, $\sqrt{8}$, 8.3, 2  
B) $7\sqrt{8}$  
C) $7\sqrt{8}$, 2, $0.\overline{66}$  
D) -4, $0.6 \times 10^6$, 8.3, $0.\overline{66}$, 2

Answer: D
7) Irrational numbers
   \(-4, 9.1 \times 10^3, 7\sqrt{6}, 8.6, 4.5, 0.49\)

   A) \(7\sqrt{6}\)       B) \(7\sqrt{6}, 4.5, 0.49\)
   C) \(7\sqrt{6}, 0.49\) D) \(-4, 9.1 \times 10^3, 0.49, 4.5\)

   Answer: A

For the measured quantity, state the set of numbers that is most appropriate to describe it. Choose from the natural numbers, integers, or rational numbers.

8) Populations of cities
   A) Rational numbers       B) Natural numbers       C) Integers
   Answer: B

9) Hat sizes
   A) Natural numbers       B) Integers       C) Rational numbers
   Answer: C

10) Temperatures given in a winter weather forecast in Alaska
    A) Rational numbers       B) Natural numbers       C) Integers
    Answer: C

11) Temperatures given in a weather forecast in Cayembe, Equador (this town is on the equator)
    A) Rational numbers       B) Integers       C) Natural numbers
    Answer: C

12) Numbers of sales of cakes at a bakery
    A) Integers       B) Natural numbers       C) Rational numbers
    Answer: B

13) The lengths of randomly cut pieces of string (measured using a ruler)
    A) Natural numbers       B) Rational numbers       C) Integers
    Answer: B

14) The populations of armies of termites living in the walls of houses
    A) Natural numbers       B) Integers       C) Rational numbers
    Answer: A

15) The lengths of randomly cut pieces of string measured to the nearest inch
    A) Integers       B) Rational numbers       C) Natural numbers
    Answer: C

16) The average speeds of race cars for one lap at Wilmot Speedway
    A) Integers       B) Natural numbers       C) Rational numbers
    Answer: C

17) The number of cars sold in an average month at Bob’s Auto Sales
    A) Integers       B) Rational numbers       C) Natural numbers
    Answer: C
Write the number in scientific notation.

18) 7,100,000
   A) $7.1 \times 10^7$  B) $7.1 \times 10^{-7}$  C) $7.1 \times 10^6$  D) $7.1 \times 10^{-6}$
   Answer: C

19) 0.000286
   A) $2.86 \times 10^{-3}$  B) $2.86 \times 10^4$  C) $2.86 \times 10^{-5}$  D) $2.86 \times 10^{-4}$
   Answer: D

20) 790,000
   A) $7.9 \times 10^6$  B) $7.9 \times 10^{-5}$  C) $7.9 \times 10^5$  D) $7.9 \times 10^{-6}$
   Answer: C

21) 9400
   A) $9.4 \times 10^{-3}$  B) $9.4 \times 10^3$  C) $9.4 \times 10^{-2}$  D) $9.4 \times 10^2$
   Answer: B

22) 0.0000005
   A) $5 \times 10^{-8}$  B) $5 \times 10^{-6}$  C) $5 \times 10^{-7}$  D) $5 \times 10^{-9}$
   Answer: C

Write the number in standard form.

23) $1.29 \times 10^6$
   A) 12,900,000  B) 77.4  C) 1,290,000  D) 129,000
   Answer: C

24) $4.002 \times 10^7$
   A) 40,020,000  B) 4,002,000  C) 400,200,000  D) 280.14
   Answer: A

25) $7.4889 \times 10^5$
   A) 7,488,900  B) 748,890  C) 374,445  D) 74,889
   Answer: B

26) $7.21 \times 10^{-4}$
   A) 0.00721  B) 0.000721  C) -721,000  D) 0.0000721
   Answer: B

27) $3.392 \times 10^{-5}$
   A) 0.000003392  B) -339,200  C) 0.0003392  D) 0.000003392
   Answer: D

28) $5.247 \times 10^{-6}$
   A) 0.000005247  B) 0.0000005247  C) 0.00005247  D) -5,247,000
   Answer: A
29) $2.0365 \times 10^{-7}$
   A) -203,650,000  B) 0.00000020365  C) 0.00000020365  D) 0.00000020365
   Answer: C

Use a calculator to approximate the expression. Write your answer in scientific notation, and round to the nearest tenth as needed.

30) $(2.8 \times 10^5)(2.9 \times 10^7)$
   A) $81 \times 10^{35}$  B) $8.1 \times 10^{35}$  C) $81 \times 10^{12}$  D) $8.1 \times 10^{12}$
   Answer: D

31) $\frac{6.9 \times 10^6}{0.0096}$
   A) $6.8 \times 10^6$  B) $7.2 \times 10^8$  C) $7.6 \times 10^8$  D) $7.2 \times 10^6$
   Answer: B

32) $(2.5 \times 10^5) + (1.3 \times 10^7)$
   A) $1.5 \times 10^{12}$  B) $1.3 \times 10^7$  C) $1.5 \times 10^{-7}$  D) $1.3 \times 10^{-12}$
   Answer: B

Use a calculator to evaluate the expression. Round your answer to the nearest thousandth.

33) $\sqrt[3]{10^7}$
   A) 5.447  B) 7.047  C) 3.747  D) 4.747
   Answer: D

34) $\sqrt{46 + \pi^3}$
   A) 9.762  B) 8.775  C) 6.304  D) 9.799
   Answer: B

35) $|2 - \pi^2|$
   A) 9.882  B) -7.87  C) -9.881  D) 7.87
   Answer: D

36) $\frac{4.19 - 5.86}{11.6 + 3.7}$
   A) -0.063  B) -0.071  C) -0.058  D) -0.109
   Answer: D

37) $4 \cdot (4.2^2) - 2(4) + 6$
   A) 73.852  B) 79.852  C) 67.852  D) 0.852
   Answer: A

Find the percent change if a quantity changes from $P_1$ to $P_2$. Round your answer to the nearest tenth if appropriate.

38) $P_1 = 18, P_2 = 55$
   A) -205.6  B) 67.3  C) 205.6  D) -67.3
   Answer: C
39) \( P_1 = 5.3, P_2 = 2.3 \)
   
   A) 56.6  
   B) \(-56.6\)  
   C) 130.4  
   D) \(-130.4\)

   Answer: B

**Use the information given in the table to solve the problem.**

40) The table gives the Consumer Price Index for selected years.

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>CPI</td>
<td>29.9</td>
<td>38</td>
<td>46.3</td>
<td>65.3</td>
<td>84.1</td>
</tr>
</tbody>
</table>

What is the percent change (to the nearest tenth of a percent) in prices from 1965 to 1980?

A) 221.7 %  
B) 120.1 %  
C) 121.3 %  
D) 123.6 %

Answer: C

41) The table gives the Consumer Price Index for selected years.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>CPI</td>
<td>29.8</td>
<td>35.5</td>
<td>46.8</td>
<td>63.4</td>
<td>81.8</td>
</tr>
</tbody>
</table>

What is the percent change (to the nearest tenth of a percent) in prices from 1960 to 1975?

A) 112.8 %  
B) 117 %  
C) 114 %  
D) 122.8 %

Answer: A

42) The table gives the Consumer Price Index for selected years.

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</thead>
<tbody>
<tr>
<td>CPI</td>
<td>30.1</td>
<td>37.9</td>
<td>48</td>
<td>69.1</td>
<td>78.5</td>
</tr>
</tbody>
</table>

Use the concept of an average or mean to estimate the CPI in 1961.

A) 34.9  
B) 34  
C) 35.5  
D) 31.6

Answer: B

43) The table gives the Consumer Price Index for selected years.

<table>
<thead>
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</thead>
<tbody>
<tr>
<td>CPI</td>
<td>29.6</td>
<td>39.3</td>
<td>46.3</td>
<td>57.3</td>
<td>79.9</td>
</tr>
</tbody>
</table>

Use the concept of an average or mean to estimate the CPI in 1965.

A) 54.9  
B) 51.8  
C) 50.2  
D) 52.5

Answer: B

44) The table gives the value of a 1957 Chevy BelAir in #2 condition for selected years.

<table>
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<tr>
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</thead>
<tbody>
<tr>
<td>Value in dollars</td>
<td>8351</td>
<td>8489</td>
<td>9935</td>
<td>10,610</td>
<td>12,935</td>
</tr>
</tbody>
</table>

What is the percent change (to the nearest tenth of a percent) in the value of a 1957 Chevy BelAir in #2 condition from 1982 to 1986.

A) 25 %  
B) 25.9 %  
C) 21.3 %  
D) 30.3 %

Answer: A

45) The table gives the value of a 1957 Chevy BelAir in #2 condition for selected years.

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<tr>
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</thead>
<tbody>
<tr>
<td>Value in dollars</td>
<td>8322</td>
<td>8488</td>
<td>9913</td>
<td>10,554</td>
<td>12,402</td>
</tr>
</tbody>
</table>

Use the concept of an average or mean to estimate the value of a 1957 Chevy BelAir in #2 condition in 1983.

A) \$ 9171.37  
B) \$ 9200.50  
C) \$ 9229.63  
D) \$ 9190.50

Answer: B
46) The table gives the value of a 1957 Chevy BelAire in #2 condition for selected years.

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>Value in dollars</td>
<td>8230</td>
<td>8460</td>
<td>9875</td>
<td>10,603</td>
<td>12,924</td>
</tr>
</tbody>
</table>

What is the percent change (to the nearest tenth of a percent) in the value of a 1957 Chevy BelAir in #2 condition from 1982 to 1988?

A) 52.8 %  
B) 50.7 %  
C) 57.1 %  
D) 51.2 %

Answer: A

47) The table gives the value of a 1957 Chevy BelAire in #2 condition for selected years.

<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Value in dollars</td>
<td>8365</td>
<td>8458</td>
<td>9857</td>
<td>10,539</td>
<td>11,939</td>
</tr>
</tbody>
</table>

Use the concept of an average or mean to estimate the value of a 1957 Chevy BelAire in #2 condition in 1985.

A) $10,174.28  
B) $10,209.07  
C) $10,202.23  
D) $10,198.00

Answer: D

Solve. Write results using scientific notation.

48) Assume that the volume of the earth is $4.0 \times 10^{14}$ cubic meters and the volume of a bacterium is $3.4 \times 10^{-16}$ cubic meters. If the earth could be filled with bacteria, how many would it contain?

A) $1.18 \times 10^{-31}$ bacteria  
B) $1.18 \times 10^{30}$ bacteria  
C) $1.18 \times 10^{31}$ bacteria  
D) $1.18 \times 10^{-30}$ bacteria

Answer: B

49) A computer can do one calculation in $1.9 \times 10^{-7}$ seconds. How long would it take the computer to do a trillion ($10^{12}$) calculations?

A) $1.9 \times 10^{-7}$ sec  
B) $1.9 \times 10^{5}$ sec  
C) $1.9 \times 10^{6}$ sec  
D) $1.9 \times 10^{12}$ sec

Answer: B

50) The national debt of a small country is $6,960,000,000 and the population is 2,665,000. What is the amount of debt per person?

A) $2.61 \times 10^{6}$  
B) $26.10 \times 10^{2}$  
C) $2.61$  
D) $2.61 \times 10^{3}$

Answer: D

51) A company produced 922,000 small appliances in one year and made a profit of $7,600,000. What was the profit on each appliance?

A) $1.21 \times 10^{1}$  
B) $1.21 \times 10^{-1}$  
C) $8.24$  
D) $8.24 \times 10^{-1}$

Answer: C

52) The earth is approximately 92,900,000 miles from the sun. If 1 mile = $1.61 \times 10^{3}$ m, what is the distance to the sun in meters?

A) $1.50 \times 10^{10}$ m  
B) $1.50 \times 10^{11}$ m  
C) $5.7 \times 10^{-10}$ m  
D) $5.7 \times 10^{10}$ m

Answer: B

53) The distance from the earth to the sun is 92,900,000 miles. How long would it take a rocket, traveling at $2.9 \times 10^{3}$ miles per hour, to reach the sun?

A) $3.2 \times 10^{2}$ hr  
B) $3.2 \times 10^{3}$ hr  
C) $3.2 \times 10^{4}$ hr  
D) $3.2$ hr

Answer: C
54) A light-year is the distance that light travels in one year. Find the number of miles in a light-year if light travels 1.86 x 10^5 miles per second.
   A) 5.9 x 10^{14} miles  B) 5.9 x 10^7 miles  C) 5.9 x 10^5 miles  D) 5.9 x 10^{12} miles
   Answer: D

55) The following equation gives the number of atoms in 390 g of fluorine. How many atoms are there?
   \[ A = 390 \text{ g Fl} \times \frac{1 \text{ mole Fl}}{19.0 \text{ g Fl}} \times \frac{6.022 \times 10^{23} \text{ atoms}}{1 \text{ mole Fl}} \]
   A) 1.23 x 10^{25} atoms  B) 1.24 x 10^{25} atoms  C) 2.93 x 10^{24} atoms  D) 4.46 x 10^{26} atoms
   Answer: B

Solve the problem.

56) A comet has a nearly circular orbit around a star with a radius of 330 million miles and requires 8.24 earth years to complete one orbit. Estimate the orbital speed of the comet in miles per hour. Round to the nearest mile per hour.
   A) 28,725 mph  B) 252 mph  C) 689,404 mph  D) 251,632,423 mph
   Answer: A

57) An oil spill of 3971 cubic centimeters is spilled onto a pond and spreads out in a circular shape having a diameter of 766 centimeters. Approximate the thickness of the oil film to four decimal places.
   A) 1.6501 cm  B) 0.0086 cm  C) 3.3003 cm  D) 116.0506 cm
   Answer: B

Plot each number on a number line.

58) -1.5, 0, 5, -3
   A)
   B)
   C)
   D)
   Answer: D
59) 0.8, -0.6, -2, 0

Answer: B

60) 250, -50, 300, -200

Answer: D

61) -30, 10, 40, -60

Answer: B

Find the mean of the set of data. Round to the nearest tenth.

62) 13, 9, 1, 7, 10, 13, 5, 12

A) 7.8  
B) 10.8  
C) 7.9  
D) 8.0

Answer: C

63) 110, 49, 2, 67, 70, 43, 54, 111, 4

A) 48.9  
B) 56.2  
C) 63.8  
D) 56.7

Answer: D
64) 3, 11, 4, 3, 3, 4, 4, 4, 4, 11, 4, 11, 4
   A) 4.9   B) 5.4   C) 5.3   D) 6.4
   Answer: B

65) 80, 42, 53, 53, 42, 80, 2, 2, 2, 80, 2, 2, 53
   A) 38.1   B) 37.9   C) 36.7   D) 40.9
   Answer: B

66) 229, 221, 213, 213, 213, 221, 215, 215, 215, 221, 221
   A) 217.5   B) 217.7   C) 217.2   D) 218.4
   Answer: A

67) 0, 3, 5, 7, 7, 3, 5, 0, 7, 3, 3
   A) 3.6   B) 3.8   C) 4.8   D) 4.6
   Answer: A

Find the median of the set of data.
68) 6, 10, 17, 23, 32, 43, 50
   A) 26   B) 32   C) 17   D) 23
   Answer: D

69) 15, 30, 40, 48, 60, 75, 80
   A) 40   B) 60   C) 50   D) 48
   Answer: D

70) 92, 25, 218, 112, 276, 240, 233
   A) 171   B) 218   C) 112   D) 233
   Answer: B

71) 69, 141, 246, 275, 425, 482
   A) 275   B) 234.5   C) 260.5   D) 246
   Answer: C

72) 8, 5, 27, 17, 29, 50, 37, 32
   A) 27   B) 29   C) 25.5   D) 28
   Answer: D

73) 39, 20, 8, 5, 26, 13, 29, 30, 39, 30
   A) 27.5   B) 29   C) 24   D) 26
   Answer: A

Find the distance in the xy-plane between the two points. Round an approximate result to the nearest hundredth.
74) (12, 0) and (0, 9)
   A) 3   B) 3.87   C) 30   D) 15
   Answer: D

75) (5, 7) and (15, 31)
   A) 24   B) 4.90   C) 26   D) 10
   Answer: C
76) (-5, 1) and (-9, -2)  
A) -5  
B) 5  
C) 2.24  
D) 12  
Answer: B

77) (-1, 1) and (3, -5)  
A) 6.93  
B) 24  
C) 7.21  
D) 26  
Answer: C

78) (-2, -2) and (0, -8)  
A) 3.16  
B) 20  
C) 6  
D) 6.32  
Answer: D

79) (7.3, 1.5) and (1.3, 7.5)  
A) 16.97  
B) 12  
C) 8.49  
D) 1.41  
Answer: C

80) (4.6, -0.5) and (2.6, -4.5)  
A) 4  
B) 4.47  
C) 8.94  
D) 2.24  
Answer: B

Find the midpoint of the line segment joining the two points.

81) (7, 0) and (9, 2)  
A) (16, 2)  
B) (-1, -1)  
C) (-2, -2)  
D) (8, 1)  
Answer: D

82) (2, -6) and (-4, 0)  
A) (-1, -3)  
B) (3, -3)  
C) (-2, -6)  
D) (6, -6)  
Answer: A

83) (-2, -6) and (3, 9)  
A) (-5, -15)  
B) \left( \frac{-5}{2}, -\frac{15}{2} \right)  
C) \left( \frac{1}{2}, \frac{3}{2} \right)  
D) (1, 3)  
Answer: C

84) (-2, -3) and (4, -8)  
A) (-6, 5)  
B) \left( 1, -\frac{11}{2} \right)  
C) (2, -11)  
D) \left( -3, \frac{5}{2} \right)  
Answer: B

85) \left( \frac{-5}{2}, \frac{3}{2} \right) \text{ and } \left( \frac{5}{2}, \frac{-9}{2} \right)  
A) (0, 36)  
B) \left( \frac{-5}{2}, 3 \right)  
C) (100, 144)  
D) \left( 0, -\frac{3}{2} \right)  
Answer: D

86) \sqrt{5}, -\sqrt{10} \text{ and } (-\sqrt{5}, 0)  
A) \left( 3\sqrt{10}, -\frac{\sqrt{30}}{2} \right)  
B) (-5, 10)  
C) \left( 4\sqrt{5}, \frac{\sqrt{10}}{2} \right)  
D) \left( 3\sqrt{5}, -\frac{\sqrt{10}}{2} \right)  
Answer: D
87) \((-\sqrt{6}, 1)\) and \((0, \sqrt{3})\)

A) \((-\sqrt{6}, 1 + \sqrt{3})\)

B) \(\left(\frac{\sqrt{6}}{2}, 1 - \frac{1}{\sqrt{3}}\right)\)

C) \(\left(\frac{-\sqrt{6} + \sqrt{3}}{2}, \frac{1}{2}\right)\)

D) \(\left(\frac{-\sqrt{6} + \sqrt{3}}{2}, \frac{1}{2}\right)\)

Answer: D

Find the domain and range of the relation.

88) \([-6,9), (3,-5), (5,-3), (1,-2), (7,-8)]\)

A) D = \([-8,-6,9,3,-5] ; R = \{5,-3,1,-2,7\}\)

B) D = \([5,1,7,-6,3] ; R = \{-3,-2,-8,9,-5\}\)

C) D = \([5,-3,1,-2,7] ; R = \{-8,-6,9,3,-5\}\)

D) D = \([-3,-2,-8,9,-5] ; R = \{5,1,7,-6,3\}\)

Answer: B

89) \((8,4), (-8,5), (2,2), (2,-5)]\)

A) D = \([4,2,5,-5] ; R = \{8,2,-8\}\)

B) D = \([8,2,-8,2] ; R = \{4,2,5,-5\}\)

C) D = \([8,2,-8,-2] ; R = \{4,2,5,-5\}\)

D) D = \([8,2,-8] ; R = \{4,2,5,-5\}\)

Answer: D

90) \((10,-4), (10,-9), (-9,-7), (-2,-3), (11,6)]\)

A) D = \([-2,11,10,-9] ; R = \{-3,6,-9,-7,-4\}\)

B) D = \([-2,-4,11,10,-9] ; R = \{-3,6,-9,-7,-4\}\)

C) D = \([-3,6,-9,-7,-4] ; R = \{-2,-2,11,10,-9\}\)

D) D = \([-2,-2,11,10,-9] ; R = \{-3,6,-9,-7,-4\}\)

Answer: A

91) \((-4,-8), (-2,2), (-8,9), (-8,5)]\)

A) D = \([-2,-4,-8,8] ; R = \{2,-8,9,5\}\)

B) D = \([-2,-4,-8,8] ; R = \{2,-8,9,5\}\)

C) D = \([2,-8,9,5] ; R = \{-2,-4,-8\}\)

D) D = \([-2,-4,-8] ; R = \{2,-8,9,5\}\)

Answer: D

92) \((-7,-4), (-2,5), (-8,-1), (8,-3)]\)

A) D = \([-8,-7,-2,8] ; R = \{-1,4,5,-3\}\)

B) D = \([-8,-7,-2,8] ; R = \{-1,4,5,-3\}\)

C) D = \([-8,-7,-2,8] ; R = \{-1,4,5,-3\}\)

D) D = \([-1,4,5,-3] ; R = \{-8,-7,-2,8\}\)

Answer: A

93) \((-67,-94), (-43,-68), (-15,-50), (25,-27), (85,44)]\)

A) D = \([-94,-68,-50,-27] ; R = \{-67,-43,-15,25\}\)

B) D = \([-67,-43,-15,25] ; R = \{-94,-68,-50,-27,44\}\)

C) D = \([-94,-68,-50,-27,44] ; R = \{-67,-43,-15,25,85\}\)

D) D = \([-67,-43,-15,25] ; R = \{-94,-68,-50,-27\}\)

Answer: B

94) \((-11.54,-8.99), (-8.07,-6.13), (-3.52,-3.07), (5.97,-0.1)\), \((12.13,4.56)]\)

A) D = \([-11.54,-8.07,-3.52] ; R = \{-9.99,-6.13,-3.07,-0.1,4.56\}\)

B) D = \([-8.99,-6.13,-0.1,4.56] ; R = \{-11.54,-8.07,-3.52,5.97\}\)

C) D = \([-11.54,-8.07,5.97,12.13] ; R = \{-8.99,-6.13,-3.07,-0.1\}\)

D) D = \([-8.99,-6.13,-3.07,-0.1,4.56] ; R = \{-11.54,-8.07,-3.52,5.97,12.13\}\)

Answer: A

Plot the relation in the xy-plane.
95) \{(0, 3), (-3, -2), (4, 1), (-8, -10), (-1, 9)\}

Answer: B
96) \((10, 35), (-35, -20), (40, 15), (-57, -20), (-10, 64)\)

Answer: B
97) \{(0.4, 1.3), (-1.3, -1.2), (1.4, -0.1), (0.7, -0.5), (-1, 0.9)\}

Answer: C
98) \{ (0, 3), (-3, 2), (4, 1), (-4, -10), (-1, 7) \}

Answer: B
99) \{(10, 35), (2, -29), (40, 15), (-78, -20), (-10, 63)\}

Answer: D
100) \{ (0.4, 1.3), (-1.3, 1), (1.4, -0.1), (0.5, -0.5), (-1, 0.6) \}

Answer: C
101) \{(0, -6), (-5, -4), (-7, 0), (-7, -10), (-1, 7)\}

Answer: B
102) \{(0, 56), (-7, -23), (-23, 0), (-77, -20), (-10, 50)\}

Answer: C
103) \{ (0, -1.4), (-1.1, 1.5), (-0.8, 0), (0.8, -0.5), (-1, 0.6) \}

Answer: C

Make a scatterplot of the data.
104) \[ \{(-1, -8), (-6, -4), (-2, -5), (-5, -5), (-1, 4), (-1, -2), (-6, -7), (9, 1), (-4, -5), (-1, -3)\} \]

Answer: B
105) \{ (0.7, 0.16), (0.74, 0.34), (0.66, 0.04), (0.52, 0.32), (0.01, -0.85),
(0.05, 0.95), (0.07, 0.89), (0.5, 0.24) \}

Answer: D
106) \([(23, 50), (-9, 16), (22, 41), (-9, -16), (-5, -2), (8, 31), (3, 7), (16, 64), (-9, -1), (-5, 6)]\)
Make a line graph of the data.

107) The following table shows the average tuition for one semester at City X College over various years. Use time on the horizontal scale for your line graph.

<table>
<thead>
<tr>
<th>Year</th>
<th>Average College Tuition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>$1000</td>
</tr>
<tr>
<td>1981</td>
<td>1500</td>
</tr>
<tr>
<td>1982</td>
<td>2500</td>
</tr>
<tr>
<td>1983</td>
<td>3500</td>
</tr>
</tbody>
</table>

Answer: Answers may vary. A possible answer follows.
The following table shows the number of computer sales made at Computer Buy over five months. Use time on the horizontal scale for your line graph.

<table>
<thead>
<tr>
<th>Month</th>
<th>Number of Computers Sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>213</td>
</tr>
<tr>
<td>2</td>
<td>256</td>
</tr>
<tr>
<td>3</td>
<td>311</td>
</tr>
<tr>
<td>4</td>
<td>527</td>
</tr>
<tr>
<td>5</td>
<td>489</td>
</tr>
</tbody>
</table>

Answer: Answers may vary. A possible answer follows.
109) The following table shows the median teacher’s salary in District X over several years. Use time on the horizontal scale for your line graph.

<table>
<thead>
<tr>
<th>Year</th>
<th>Average Salary, in thousands</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>$53.3</td>
</tr>
<tr>
<td>1981</td>
<td>46.5</td>
</tr>
<tr>
<td>1982</td>
<td>42.0</td>
</tr>
<tr>
<td>1983</td>
<td>69.0</td>
</tr>
<tr>
<td>1984</td>
<td>72.8</td>
</tr>
<tr>
<td>1985</td>
<td>80.3</td>
</tr>
</tbody>
</table>

Answer: Answers may vary. The following is a possible answer.

Average Teacher’s Salary at District X
110) The following table gives the average cost of producing a music video over the given years. Use time on the horizontal scale for your line graph.

<table>
<thead>
<tr>
<th>Year</th>
<th>Production Cost, in millions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>$8.4</td>
</tr>
<tr>
<td>1984</td>
<td>7.6</td>
</tr>
<tr>
<td>1986</td>
<td>6.0</td>
</tr>
<tr>
<td>1988</td>
<td>4.4</td>
</tr>
<tr>
<td>1990</td>
<td>3.2</td>
</tr>
<tr>
<td>1992</td>
<td>5.6</td>
</tr>
<tr>
<td>1994</td>
<td>12.4</td>
</tr>
</tbody>
</table>

Answer: Answers may vary. A possible answer follows.
111) The following table gives the total amount of precipitation during the given months. Use time on the horizontal scale for your line graph.

<table>
<thead>
<tr>
<th>Month</th>
<th>Total Precipitation, in Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov.</td>
<td>1.52</td>
</tr>
<tr>
<td>Dec.</td>
<td>2.72</td>
</tr>
<tr>
<td>Jan.</td>
<td>3.76</td>
</tr>
<tr>
<td>Feb.</td>
<td>6.04</td>
</tr>
<tr>
<td>Mar.</td>
<td>5.56</td>
</tr>
<tr>
<td>April</td>
<td>7.44</td>
</tr>
<tr>
<td>May</td>
<td>8.28</td>
</tr>
</tbody>
</table>

Answer: Answers may vary. A possible answer follows.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find the center and radius of the circle.

112) \(x^2 + y^2 = 16\)
   A) Center: (0, 0), radius: 16  
   B) Center: (1, 1), radius: 16  
   C) Center: (0, 0), radius: 4  
   D) Center: (1, 1), radius: 4  

Answer: C

113) \(x^2 + y^2 = 5\)
   A) Center: (1, 1), radius: 5  
   B) Center: (0, 0), radius: \(\sqrt{5}\)  
   C) Center: (1, 1), radius: \(\sqrt{5}\)  
   D) Center: (0, 0), radius: 5  

Answer: B

114) \((x + 5)^2 + (y + 4)^2 = 4\)
   A) Center: \((-4, -5)\), radius = 2  
   B) Center: \((4, 5)\), radius = 4  
   C) Center: \((-5, -4)\), radius = 2  
   D) Center: \((5, 4)\), radius = 4  

Answer: C
115) \(x^2 + (y - 7)^2 = 25\)
   - A) Center: (0, 7), radius = 5
   - B) Center: (7, 0), radius = 5
   - C) Center: (0, -7), radius = 5
   - D) Center: (0, 7), radius = 25
   Answer: A

116) \((x - 1)^2 + y^2 = 81\)
   - A) Center: (-1, 0), radius = 9
   - B) Center: (1, 0), radius = 81
   - C) Center: (0, 1), radius = 9
   - D) Center: (1, 0), radius = 9
   Answer: D

117) \(6x^2 + 6y^2 = 36\)
   - A) Center: (0, 0), radius: 6
   - B) Center: (0, 0), radius: 36
   - C) Center: (6, 6), radius: \(\sqrt{6}\)
   - D) Center: (0, 0), radius: \(\sqrt{6}\)
   Answer: D

118) \(x^2 - 10x + 25 + y^2 - 4y + 4 = 64\)
   - A) (5, 2), r = 8
   - B) (-5, -2), r = 64
   - C) (2, 5), r = 8
   - D) (-2, -5), r = 64
   Answer: A

119) \(x^2 + y^2 - 16x + 8y + 80 = 36\)
   - A) (8, -4), r = 6
   - B) (4, -8), r = 36
   - C) (-4, 8), r = 6
   - D) (-8, 4), r = 36
   Answer: A

120) \(x^2 + y^2 - 18x - 8y = -72\)
   - A) (-9, -4), r = 25
   - B) (-4, -9), r = 25
   - C) (4, 9), r = 5
   - D) (9, 4), r = 5
   Answer: D

121) \(x^2 + y^2 = 2x + 63\)
   - A) (-1, 0), r = 8
   - B) (-1, 0), r = 64
   - C) (1, 0), r = 8
   - D) (1, 0), r = 64
   Answer: C

122) \(x^2 + 10x + y^2 + 16y + 25 = 0\)
   - A) (5, 8), r = 8
   - B) (-5, -8), r = 64
   - C) (-5, -8), r = 8
   - D) (5, 8), r = 64
   Answer: C
Use the graph to find the standard equation of the circle.

123)

A) $x^2 + y^2 = 16$  
B) $x^2 + y^2 = 8$  
C) $x^2 + y^2 = 36$  
D) $x^2 + y^2 = 64$

Answer: D

124)

A) $(x + 3)^2 + (y - 1)^2 = 4$  
B) $(x - 3)^2 + (y + 1)^2 = 16$  
C) $(x - 3)^2 + (y + 1)^2 = 4$  
D) $(x + 3)^2 + (y - 1)^2 = 16$

Answer: B

125)

A) $(x + 2)^2 + (y - 3)^2 = 16$  
B) $(x + 2)^2 + (y - 3)^2 = 4$  
C) $(x - 2)^2 + (y + 3)^2 = 4$  
D) $(x - 2)^2 + (y + 3)^2 = 16$

Answer: A
126) A) $x^2 + (y + 1)^2 = 4$  
B) $x^2 + (y - 1)^2 = 16$  
C) $(x + 1)^2 + y^2 = 16$  
D) $x^2 + (y + 1)^2 = 16$ 
Answer: D

127) A) $(x + 1)^2 + y^2 = 25$  
B) $(x + 1)^2 + y^2 = 5$  
C) $x^2 + (y + 1)^2 = 25$  
D) $(x - 1)^2 + y^2 = 25$ 
Answer: A

Find the standard equation of the circle that satisfies the conditions.

128) Center (-8, -10), radius 9  
A) $(x - 8)^2 + (y - 10)^2 = 81$  
B) $(x + 10)^2 + (y + 8)^2 = 9$  
C) $(x - 10)^2 + (y - 8)^2 = 9$  
D) $(x + 8)^2 + (y + 10)^2 = 81$ 
Answer: B

129) Center (5, -3), radius $\sqrt{11}$  
A) $(x - 5)^2 + (y + 3)^2 = 11$  
B) $(x + 5)^2 + (y - 3)^2 = 11$  
C) $(x - 3)^2 + (y + 5)^2 = 121$  
D) $(x + 3)^2 + (y - 5)^2 = 121$ 
Answer: A

130) Center (-9, 0), radius 5  
A) $x^2 + (y - 9)^2 = 5$  
B) $(x + 9)^2 + y^2 = 25$  
C) $x^2 + (y + 9)^2 = 5$  
D) $(x - 9)^2 + y^2 = 25$ 
Answer: B
131) Center (0, 0), radius 10
   A) \((x - 10)^2 + (y - 10)^2 = 100\)  B) \(x^2 + y^2 = \sqrt{10}\)
   C) \(x^2 + y^2 = 10\)  D) \(x^2 + y^2 = 100\)
Answer: D

132) Center \((6, -9)\) with the point \((9, -5)\) on the circle
   A) \((x - 9)^2 + (y + 6)^2 = 9\)  B) \((x + 9)^2 + (y - 6)^2 = 9\)
   C) \((x + 6)^2 + (y - 9)^2 = 25\)  D) \((x - 6)^2 + (y + 9)^2 = 25\)
Answer: D

133) Endpoints of a diameter \((6, 5)\) and \((-5, 3)\)
   A) \(\left(x + \frac{1}{2}\right)^2 + \left(y + \frac{4}{2}\right)^2 = 65\)
   B) \(\left(x + \frac{1}{2}\right)^2 + (y - \frac{4}{2})^2 = 5\)
   C) \(\left(x - \frac{11}{2}\right)^2 + (y - 1)^2 = 125\)
   D) \(\left(x - \frac{1}{2}\right)^2 + (y - \frac{4}{2})^2 = \frac{125}{4}\)
Answer: D

Provide the requested response.
134) For the viewing rectangle \([-10, 10, 2]\) by \([-8, 8, 2]\), state the number of tick marks on the positive x-axis.
   A) 8  B) 4  C) 10  D) 5
Answer: D

135) For the viewing rectangle \([0, 14, 2]\) by \([0, 22, 2]\), state the number of tick marks on the positive y-axis.
   A) 22  B) 14  C) 11  D) 7
Answer: C

136) For the viewing rectangle \([-35, 35, 5]\) by \([0, 25, 5]\), state the number of tick marks on the positive x-axis.
   A) 9  B) 5  C) 7  D) 12
Answer: C

137) For the viewing rectangle \([1970, 2010, 10]\) by \([13,000, 29,000, 1000]\), state the number of tick marks on the positive x-axis.
   A) 2  B) 8  C) 7  D) 5
Answer: D

138) For the viewing rectangle \([1970, 2010, 10]\) by \([13,000, 27,000, 1000]\), state the number of tick marks on the positive y-axis.
   A) 10  B) 21  C) 15  D) 17
Answer: C
139) Choose the correct viewing rectangle to match the settings: $[-8, 8, 1]$ by $[-8, 8, 1]$.

A) 

B) 

C) 

D) 

Answer: B
140) Choose the correct viewing rectangle to match the settings: \([-3, 7, 1]\) by \([-5, 8, 1]\).

A)  

B)  

C)  

D)  

Answer: D
141) Choose the correct viewing rectangle to match the settings: \([-200, 200, 50]\) by \([-100, 100, 20]\).

A)

B)

C)

D)

Answer: B
142) Choose the correct viewing rectangle to match the settings: [ -2 , 10 , 1 ] by [ -4 , 8 , 1 ]

A) 

B) 

C) 

D) 

Answer: A
143) Choose the correct viewing rectangle to match the settings: [−2, 10, 2] by [−4, 12, 4]

A) 

B) 

C) 

D) 

Answer: D

144) If \( f(-9) = -7 \) identify a point on the graph of \( f \).

A) \((9, -7)\)  
B) \((-9, 7)\)  
C) \((-9, -7)\)  
D) \((-7, -9)\)

Answer: C

145) If the point \((-1, 9.1)\) lies on the graph of \( f \), then \( f(\_\_) = \_\_\_ \).

A) \( f(-1) = 0 \)  
B) \( f(-1) = 9.1 \)  
C) \( f(0) = 9.1 \)  
D) \( f(9.1) = -1 \)

Answer: B

Graph \( f \) by hand by first plotting points to determine the shape of the graph.
146) \( f(x) = 4x + 6 \)

Answer: D
147) $f(x) = x - 3$

Answer: B
148) $f(x) = 2x$

Answer: B
149) \( f(x) = \frac{1}{3}x + 6 \)

Answer: C
150) \( f(x) = \frac{1}{3}x \)

Answer: C
151) \( f(x) = -3 \)

Answer: C
152) \( f(x) = |x + 2| \)

Answer: D
153) $f(x) = \frac{1}{2}x^2$

Answer: A
154) $f(x) = \sqrt{x}$

Answer: C
155) \( f(x) = 5x^2 \)

156) Find \( f(16) \) when \( f(x) = -19x - 8 \).
   A) 296  B) -312  C) -304.8  D) -296
   Answer: B

157) Find \( g(a - 1) \) when \( g(x) = 2x - 1 \).
   A) 2a - 3  B) 2a - 1  C) \( \frac{1}{2}a - 1 \)  D) 2a + 1
   Answer: A
158) Find \( f(-1.3) \) when \( f(x) = -19 \).
   
   A) \(-19\) \hspace{1cm} B) \(-1.3\) \hspace{1cm} C) 24.7 \hspace{1cm} D) 19
   
   Answer: A

159) Find \( f(-4) \) when \( f(x) = x^2 - 2x - 6 \).
   
   A) 2 \hspace{1cm} B) 14 \hspace{1cm} C) 18 \hspace{1cm} D) 30
   
   Answer: C

160) Find \( f(k - 1) \) when \( f(x) = 5x^2 + 5x + 6 \).
   
   A) \( 5k^2 + 35k + 16 \) \hspace{1cm} B) \( 5k^2 - 5k + 6 \) \hspace{1cm} C) \(-5k^2 + 5k + 6 \) \hspace{1cm} D) \( 5k^2 - 5k + 16 \)
   
   Answer: B

161) Find \( f(8) \) when \( f(x) = \sqrt{3x + 5} \).
   
   A) \( \sqrt{13} \) \hspace{1cm} B) \( \sqrt{29} \) \hspace{1cm} C) \( \sqrt{8} \) \hspace{1cm} D) \( \sqrt{23} \)
   
   Answer: B

162) Find \( f(t + 2) \) when \( f(x) = \sqrt{4x + 3} \).
   
   A) \( \sqrt{4t + 11} \) \hspace{1cm} B) \( \sqrt{4t + 3} \) \hspace{1cm} C) \( \sqrt{4t + 15} \) \hspace{1cm} D) \( \sqrt{2t + 11} \)
   
   Answer: A

163) Find \( f(-2) \) when \( f(x) = \frac{x - 6}{x + 1} \).
   
   A) \(-8\) \hspace{1cm} B) 8 \hspace{1cm} C) \(-4\) \hspace{1cm} D) \( \frac{8}{3} \)
   
   Answer: B

**Specify the domain of the function.**

164) \( f(x) = 6x - 1 \)
   
   A) \( x \neq 0 \) \hspace{1cm} B) \( x > 0 \) \hspace{1cm} C) \( x \geq 1 \) \hspace{1cm} D) All real numbers
   
   Answer: D

165) \( f(x) = 7x^2 + 9x - 7 \)
   
   A) \( x > 0 \) \hspace{1cm} B) \( x \neq 0 \) \hspace{1cm} C) All real numbers \hspace{1cm} D) \( x < 0 \)
   
   Answer: C

166) \( f(x) = \sqrt{5 - x} \)
   
   A) \( x \neq 5 \) \hspace{1cm} B) \( x \leq 5 \) \hspace{1cm} C) All real numbers \hspace{1cm} D) \( x > \sqrt{5} \)
   
   Answer: B

167) \( f(x) = \frac{(x + 7)(x - 7)}{x^2 - 49} \)
   
   A) \( x > 49 \) \hspace{1cm} B) \( x \neq 7, x \neq -7 \) \hspace{1cm} C) All real numbers \hspace{1cm} D) \( x \neq 49 \)
   
   Answer: B
168) \( f(x) = \frac{x}{x - 5} \)

A) All real numbers  
B) \( x \neq 5 \)  
C) \( x > 0 \)  
D) \( x = -5 \)

Answer: B

169) \( f(x) = \frac{(x + 1)(x - 1)}{x^2 + 1} \)

A) \( x \neq 1 \)  
B) \( x \neq 1, x \neq -1 \)  
C) \( x > 1 \)  
D) All real numbers

Answer: D

170) \( f(x) = \frac{\sqrt{x + 4}}{(x + 4)(x - 4)} \)

A) \( x \geq -4, x \neq -4, x \neq 4 \)  
B) All real numbers  
C) \( x > 0 \)  
D) \( x \neq -4, x \neq -4, x \neq 4 \)

Answer: A

171) \( f(x) = -2 \)

A) \( x = -2 \)  
B) All real numbers  
C) \( x \geq 0 \)  
D) \( x \neq -2 \)

Answer: B

Find the domain and the range for the function.

172)

\[ \begin{array}{c}
\text{A) D: } \left\{ \frac{x}{x} \geq \frac{2}{3} \right\}, \text{ R: } \left\{ y’/y \leq 0 \right\} \\
\text{B) D: } \left\{ \frac{x}{x} \geq \frac{2}{3} \right\}, \text{ R: } \left\{ y’/y \leq 0 \right\} \\
\text{C) D: All real numbers, R: All real numbers} \\
\text{D) D: } \left\{ \frac{x}{x} \geq 0 \right\}, \text{ R: } \left\{ y’/y \geq -1 \right\} \\
\end{array} \]

Answer: C
173) A) \( \{ x | x > 0 \} \), \( \{ y | y > 0 \} \)  
C) \( \{ x | x \leq 0 \} \), \( \{ y | y \leq 0 \} \)  
Answer: D

B) \( \{ x | x > 0 \} \), \( \{ y | y \geq 0 \} \)  
D) \( \{ x \} \), \( \{ y \} \)  

174) A) \( \{ x | x \geq 0 \} \), \( \{ y | y \leq 0 \} \)  
C) \( \{ x | x \geq 2 \} \), \( \{ y | y \geq 0 \} \)  
Answer: C

B) \( \{ x | x > 2 \} \), \( \{ y | y \geq 0 \} \)  
D) \( \{ x | x > 0 \} \), \( \{ y | y < 0 \} \)  

175) A) \( \{ x | x < 0 \} \), \( \{ y | y < 0 \} \)  
C) \( \{ x | x > 0 \} \), \( \{ y | y < 15 \} \)  
Answer: B

B) \( \{ x | x > 0 \} \), \( \{ y | y \leq 10 \} \)  
D) \( \{ x | x < 0 \text{ or } x > 0 \} \), \( \{ y | y < 0 \text{ or } y > 0 \} \)
A) D: All real numbers, R: \{y \geq 0\} 
B) D: \{x \geq 9\}, R: \{y \geq 0\} 
C) D: \{x < \sqrt{9}\}, R: \{y \geq 0\} 
D) D: \{x < 9 \text{ or } x > 9\}, R: \{y < 0 \text{ or } y > 0\} 
Answer: B

A) D: \{x < 5 \text{ or } x > 5\}, R: \{y < 1 \text{ or } y > 1\} 
B) D: \{x > 0\}, R: \{y > 1\} 
C) D: All real numbers, R: All real numbers 
D) D: \{x < -5 \text{ or } x > -5\}, R: All real numbers 
Answer: A

A) D: All real numbers, R: All real numbers 
B) D: \{x < 3 \text{ or } x > 3\}, R: \{y < 6 \text{ or } y > 6\} 
C) D: \{x < -3 \text{ or } x > -3\}, R: \{y < -6 \text{ or } y > -6\} 
D) D: \{x < 6 \text{ or } x > 6\}, R: \{y < 3 \text{ or } y > 3\} 
Answer: B
179) A) D: \(x \geq 0\), R: \(y \geq 0\)
C) D: \(x \geq 4\), R: \(y \geq 4\)
Answer: C

180) A) D: \(x > 0\), R: \(y \geq 0\)
C) D: \(x > 4\), R: \(y \geq 0\)
Answer: D

Use the graph to evaluate the function value.
181) \(f(-1)\)
A) -1
B) 0
C) 4
D) 2
Answer: C

For the given function expressed verbally, give a graphical representation.
182) To convert x inches to y centimeters, multiply x by 2.54. Let $y = f(x)$ and $0 \leq x \leq 50$.

Answer: B
183) To convert \(x\) centimeters to \(y\) inches, divide \(x\) by 2.54. Let \(y = f(x)\) and \(0 \leq x \leq 15\).

Answer: A
184) To convert $x$ square yards to $y$ square feet, multiply $x$ by 9. Let $y = f(x)$ and $0 \leq x \leq 10$.

Answer: C
185) To convert x square feet to y square yards, divide x by 9. Let y = f(x) and 0 ≤ x ≤ 100.

Answer: B
Surveyors use the "link" as a unit of measure. To convert $x$ links to $y$ inches, multiply $x$ by 7.92. Let $y = f(x)$ and $0 \leq x \leq 10$.

Answer: B
Surveyors use the "link" as a unit of measure. To convert $x$ inches to $y$ links, divide $x$ by 7.92. Let $y = f(x)$ and $0 \leq x \leq 100$.

Answer: B
188) Bob buys a car that gets 9 miles per gallon of gasoline. Give a representation to compute the number of miles, \( y \), that Bob can travel with \( x \) gallons of gasoline. Let \( 0 \leq x \leq 10 \).

\[
x \cdot y
\]

A) \[ x \]

\[
\begin{array}{c|c|c|c|c|c|c|c|c|c|c}
1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 & y \\
\hline
150 & 100 & 50 & & & & & & & &
\end{array}
\]

B) \[ y \]

\[
\begin{array}{c|c|c|c|c|c|c|c|c|c|c}
1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 & y \\
\hline
150 & 100 & 50 & & & & & & & &
\end{array}
\]

C) \[ x \]

\[
\begin{array}{c|c|c|c|c|c|c|c|c|c|c}
1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 & y \\
\hline
150 & 100 & 50 & & & & & & & &
\end{array}
\]

D) \[ y \]

\[
\begin{array}{c|c|c|c|c|c|c|c|c|c|c}
1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 & y \\
\hline
150 & 100 & 50 & & & & & & & &
\end{array}
\]

Answer: A

Give a verbal representation for the given function.

189) \( f(x) = 4x^2 \). Let \( y = f(x) \).

A) To obtain \( y \): Square \( x \), then add 4 to the result.
B) To obtain \( y \): Add 4 to \( x \), then square the result.
C) To obtain \( y \): Square \( x \), then multiply the result by 4.
D) To obtain \( y \): Multiply \( x \) by 4, then square the result.

Answer: C
190) \( f(x) = 6x - 11 \). Let \( y = f(x) \).
   A) To obtain \( y \): Multiply \( x \) by 6, then subtract 11 from the result.
   B) To obtain \( y \): Multiply \( x \) by 11, then subtract 6 from the result.
   C) To obtain \( y \): Divide \( x \) by 6, then subtract 11 from the result.
   D) To obtain \( y \): Subtract 11 from \( x \), then multiply the result by 6.

Answer: A

191) \( f(x) = \frac{x}{6} + 12 \). Let \( y = f(x) \).
   A) To obtain \( y \): Multiply \( x \) by 6, then add 12 to the result.
   B) To obtain \( y \): Divide \( x \) by 6, then add 12 to the result.
   C) To obtain \( y \): Add 12 to \( x \), then divide the result by 6.
   D) To obtain \( y \): Multiply \( x \) by 12, then divide the result by 6.

Answer: B

192) \( f(x) = 4 \). Let \( y = f(x) \).
   A) \( y \) is equal to 4 plus \( x \).
   B) \( y \) is equal to 4.
   C) \( y \) is equal to 4 minus \( x \).
   D) \( y \) is equal to 4 times \( x \).

Answer: B

193) \( f(x) = \sqrt{x} + 4 \). Let \( y = f(x) \).
   A) To obtain \( y \): Add 4 to \( x \).
   B) To obtain \( y \): If \( x \) is positive or equal to zero, add 4 to \( x \). If \( x \) is negative, add 4 to the opposite of \( x \).
   C) To obtain \( y \): Multiply \( x \) by -1, then add 4 to the result.
   D) To obtain \( y \): Add 4 to the opposite of \( x \).

Answer: B

194) \( f(x) = 8 - x \). Let \( y = f(x) \).
   A) To obtain \( y \): Multiply \( x \) by -1, then subtract 8 from the result.
   B) To obtain \( y \): Subtract 8 from \( x \).
   C) To obtain \( y \): Multiply 8 by -1, then subtract \( x \) from the result.
   D) To obtain \( y \): Subtract \( x \) from 8.

Answer: D

195) \( f(x) = 14 - 4x \). Let \( y = f(x) \).
   A) To obtain \( y \): Subtract 4 from 14, then multiply the result times \( x \).
   B) To obtain \( y \): Multiply \( x \) by 4, then subtract the result from 14.
   C) To obtain \( y \): Multiply \( x \) by 14, then subtract the result from 4.
   D) To obtain \( y \): Add 4 to \( x \), then add 14 to the result.

Answer: B

Use the table to solve the problem.

196) For a function \( f \), we have the following numerical representation.

<table>
<thead>
<tr>
<th>x</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>f(x)</td>
<td>20</td>
<td>5</td>
<td>0</td>
<td>5</td>
<td>20</td>
</tr>
</tbody>
</table>

Evaluate \( f \) for \( x = -1 \).
   A) 10
   B) 5
   C) 20
   D) 0

Answer: B
197) For a function $f$ we have the following numerical representation.

<table>
<thead>
<tr>
<th>$x$</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>$f(x)$</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

Evaluate $f$ for $x = -1$.
A) 5    B) 7    C) 0    D) 6
Answer: D

198) For a function $f$ we have the following numerical representation.

<table>
<thead>
<tr>
<th>$x$</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>$y = f(x)$</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
</tbody>
</table>

Evaluate $f$ for $x = 2$.
A) 0    B) 8    C) 6    D) 7
Answer: B

199) For a function $f$ we have the following numerical representation.

<table>
<thead>
<tr>
<th>$x$</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>$y = f(x)$</td>
<td>-0.4</td>
<td>-0.2</td>
<td>3</td>
<td>0.2</td>
<td>0.4</td>
</tr>
</tbody>
</table>

Evaluate $f$ for $x = -1$.
A) -0.2    B) -0.4    C) 0.2    D) 0.4
Answer: A

200) For a function $f$ we have the following numerical representation.

<table>
<thead>
<tr>
<th>$x$</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>$y = f(x)$</td>
<td>-0.29</td>
<td>-0.14</td>
<td>3</td>
<td>0.14</td>
<td>0.29</td>
</tr>
</tbody>
</table>

Evaluate $f$ for $x = 2$.
A) -0.29    B) -0.14    C) 3    D) 0.29
Answer: D

201) The cost in dollars of driving a certain make and model of car for $x$ miles is given by the function $f$. A numerical representation of $f$ is given in the following table.

<table>
<thead>
<tr>
<th>$x$</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>$y = f(x)$</td>
<td>0.00</td>
<td>1.00</td>
<td>1.50</td>
<td>2.00</td>
<td>2.50</td>
<td>3.00</td>
<td></td>
</tr>
</tbody>
</table>

Use the table to evaluate $f$ for $x = 3$.
A) $2.00$    B) $1.50$    C) $3.00$    D) $0.50$
Answer: B
202) The cost in dollars of driving a certain make and model of car for x miles is given by the function f. A numerical representation of f is given in the following table.

<table>
<thead>
<tr>
<th>x</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>y = f(x)</td>
<td>0</td>
<td>0.49</td>
<td>0.98</td>
<td>1.47</td>
<td>1.96</td>
<td>2.45</td>
<td>2.94</td>
</tr>
</tbody>
</table>

If the cost is $1.96, how many miles have been driven?
A) 3 miles  B) 6 miles  C) 5 miles  D) 4 miles
Answer: D

203) The cost in dollars of driving a certain make and model of car for x miles is given by the function f. A numerical representation of f is given in the following table.

<table>
<thead>
<tr>
<th>x</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>y = f(x)</td>
<td>0</td>
<td>0.49</td>
<td>0.98</td>
<td>1.47</td>
<td>1.96</td>
<td>2.45</td>
<td>2.94</td>
</tr>
</tbody>
</table>

If the cost is $0.98, how many miles have been driven?
A) 1 mile  B) 4 miles  C) 3 miles  D) 2 miles
Answer: D

204) The cost, in dollars, of a cab ride for x miles is given by the function f in the following table.

<table>
<thead>
<tr>
<th>x</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>y=f(x)</td>
<td>2.85</td>
<td>3.45</td>
<td>4.05</td>
<td>4.65</td>
<td>5.25</td>
<td>5.85</td>
</tr>
</tbody>
</table>

What is the cost of a 4-mile cab ride?
A) $4.05  B) $3.45  C) $5.25  D) $4.65
Answer: D

205) The cost, in dollars, of a cab ride for x miles is given by the function f in the following table.

<table>
<thead>
<tr>
<th>x</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>y=f(x)</td>
<td>3.04</td>
<td>3.83</td>
<td>4.62</td>
<td>5.41</td>
<td>6.20</td>
<td>6.99</td>
</tr>
</tbody>
</table>

After 1 mile has been driven, what is the cost of each additional mile?
A) $0.71  B) $0.82  C) $0.67  D) $0.79
Answer: D
Determine if the relation is a function.

206) 

A) Function  
B) Not a function

Answer: A

207) 

A) Not a function  
B) Function

Answer: B

208) 

A) Function  
B) Not a function

Answer: B
209)

A) Function
B) Not a function

Answer: B

210)

A) Not a function
B) Function

Answer: B

211)

A) Not a function
B) Function

Answer: B

212) $S=\{(17, -15), (18, -13), (34, 0), (16, -15), (-17, -18)\}$

A) Not a Function
B) Function

Answer: B
213) \( S = \{(-9, -16), (-8, -14), (-18, 0), (-10, -16), (-9, -19)\} \)
   A) Function  
   B) Not a Function
   Answer: B

214)
   \[
   \begin{array}{c|cccc}
   x & -3 & -2 & -1 & 0 \\
   y & -0.1 & 0.1 & -0.2 & 0.2 \\
   \end{array}
   \]
   A) Not a Function  
   B) Function
   Answer: B

215)
   \[
   \begin{array}{c|cccc}
   x & -3 & -2 & -1 & 0 \\
   y & -1.9 & 1.9 & -3.8 & 3.8 \\
   \end{array}
   \]
   A) Not a Function  
   B) Function
   Answer: A

Answer the question.

216) In a gymnasium, a group of 32 students are individually counted off by fours to determine teams; i.e. "1, 2, 3, 4, 1, 2, 3, 4, ..."? Is a function generated by a relation that takes a student's number as input and outputs the students name with that number?
   A) No  
   B) Yes
   Answer: A

217) In the equation \( x = y^3 - 10 \), is \( y \) a function of \( x \)?
   A) Yes  
   B) No
   Answer: A

For the given function expressed verbally, give a symbolic representation.

218) To convert \( x \) inches to \( y \) centimeters, multiply \( x \) by 2.54. Let \( y = f(x) \).
   A) \( f(x) = x - 2.54 \)  
   B) \( f(x) = x/2.54 \)  
   C) \( f(x) = 2.54x \)  
   D) \( f(x) = 2.54/x \)
   Answer: C

219) To convert \( x \) centimeters to \( y \) inches, divide \( x \) by 2.54. Let \( y = f(x) \).
   A) \( f(x) = 2.54 - x \)  
   B) \( f(x) = 2.54/x \)  
   C) \( f(x) = x/2.54 \)  
   D) \( f(x) = 2.54x \)
   Answer: C

220) To convert \( x \) square yards to \( y \) square feet, multiply \( x \) by 9. Let \( y = f(x) \).
   A) \( f(x) = x/9 \)  
   B) \( f(x) = 9x \)  
   C) \( f(x) = 9/x \)  
   D) \( f(x) = 9 - x \)
   Answer: B

221) To convert \( x \) square feet to \( y \) square yards, divide \( x \) by 9. Let \( y = f(x) \).
   A) \( f(x) = 9/x \)  
   B) \( f(x) = 9x \)  
   C) \( f(x) = x/9 \)  
   D) \( f(x) = x - 9 \)
   Answer: C

222) Surveyors use the "link" as a unit of measure. To convert \( x \) links to \( y \) inches, multiply \( x \) by 7.92. Let \( y = f(x) \).
   A) \( f(x) = 7.92x \)  
   B) \( f(x) = x/7.92 \)  
   C) \( f(x) = 7.92/x \)  
   D) \( f(x) = x + 7.92 \)
   Answer: A

223) Surveyors use the "link" as a unit of measure. To convert \( x \) inches to \( y \) links, divide \( x \) by 7.92. Let \( y = f(x) \).
   A) \( f(x) = 7.92x \)  
   B) \( f(x) = x/7.92 \)  
   C) \( f(x) = 7.92/x \)  
   D) \( f(x) = 7.92 - x \)
   Answer: B
224) Bob buys a car that gets 9 miles per gallon of gasoline. Give a representation to compute the number of miles, \( y \), that Bob can travel with \( x \) gallons of gasoline. Let \( y = f(x) \).

A) \( f(x) = 9x \)  
B) \( f(x) = x + 9 \)  
C) \( f(x) = \frac{9}{x} \)  
D) \( f(x) = \frac{x}{9} \)

Answer: A

Solve the problem.

225) Assume the function \( f \) computes the number \( y \) in millions of people using the internet in year \( x \).

\[ f = \{(1996, 1.2), (1998, 4.3), (2000, 9.8)\} \]

Evaluate \( f(2000) \) and give the domain and range of \( f \).


Answer: A

226) The stretch in a loaded spring varies with the load it supports. If the spring stretches 6.9 cm for every pound of load added, find the distance in centimeters that the spring has stretched when 8 pounds are added.

A) 55.2 cm  
B) 14.9 cm  
C) 8 cm  
D) −1.1 cm

Answer: A

Find the slope of the line that goes through the pair of points.

227) \((4, −8) and (2, 4)\)

A) 12  
B) 2  
C) −6  
D) 6

Answer: C

228) \((-4, −4) and (3, 9)\)

A) \(\frac{6}{7}\)  
B) Undefined  
C) \(\frac{7}{6}\)  
D) 5

Answer: A

229) \((-1, −3) and (−6, 2)\)

A) −1  
B) 5  
C) Undefined  
D) −5

Answer: A

230) \((-3, −9) and (1, 2)\)

A) Undefined  
B) \(\frac{3}{4}\)  
C) 1  
D) −2\(\frac{3}{4}\)

Answer: B

231) \((3, −8) and (3, 4)\)

A) Undefined  
B) 2  
C) 12  
D) 6

Answer: A

232) \((-7, −9) and (4, −9)\)

A) 0  
B) 4  
C) −4  
D) 1

Answer: A
State the slope of the graph of \( f \).

233) \( f(x) = 5x + 18 \)
   A) 0  
   B) -18  
   C) 18  
   D) 5
   Answer: D

234) \( f(x) = \frac{2}{3}x + 2 \)
   A) 2  
   B) \frac{3}{2}  
   C) \frac{2}{3}  
   D) 0
   Answer: C

Solve the problem.

235) The amount of money, in dollars, raised each year by a band booster club can be estimated by the function \( f(x) = 149x - 291,515 \), where \( x \) is the year with \( 1990 \leq x \leq 2000 \). What is the slope of the graph of \( f \)?
   A) 4995  
   B) -149  
   C) -291,515  
   D) 149
   Answer: D

236) The decline in the value of a stock can be estimated by the function \( f(x) = -0.65x + 1375.5 \), where \( x \) is the year with \( 1990 \leq x \leq 2000 \). What is the slope of the graph of \( f \)?
   A) 82  
   B) 1375.5  
   C) -0.65  
   D) 0.65
   Answer: C

State whether the given function is linear and constant, linear but not constant, or nonlinear.

237) \( f(x) = -3x + 7 \)
   A) none of these  
   B) linear, constant  
   C) nonlinear  
   D) linear, but not constant
   Answer: D

238) \( f(x) = -9x^3 - 5x + 17 \)
   A) linear, but not constant  
   B) linear, constant  
   C) nonlinear  
   D) none of these
   Answer: C

239) \( f(x) = -5x^{1.45} + 6 \)
   A) linear, but not constant  
   B) nonlinear  
   C) linear, constant  
   D) none of these
   Answer: B

240) \( f(x) = -4x^4 - 2x^3 - 8x^2 + 0.12x - 10 \)
   A) linear, but not constant  
   B) none of these  
   C) nonlinear  
   D) linear, constant
   Answer: C

241) \( f(x) = -0.96x - 1.2 \)
   A) nonlinear  
   B) linear, constant  
   C) linear, but not constant  
   D) none of these
   Answer: C
242) \( f(x) = 4 \)
- A) linear, but not constant
- B) none of these
- C) nonlinear
- D) linear, constant

Answer: D

243) \( f(x) = \sqrt{x + 16} \)
- A) linear, constant
- B) none of these
- C) linear, but not constant
- D) nonlinear

Answer: D

Determine if the data in the table are linear or nonlinear.

244)

<table>
<thead>
<tr>
<th>( x )</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>18</th>
<th>19</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y )</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

- A) linear
- B) nonlinear

Answer: A

245)

<table>
<thead>
<tr>
<th>( x )</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y )</td>
<td>7</td>
<td>9</td>
<td>11</td>
<td>13</td>
<td>15</td>
<td>17</td>
</tr>
</tbody>
</table>

- A) nonlinear
- B) linear

Answer: B

246)

<table>
<thead>
<tr>
<th>( x )</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y )</td>
<td>3</td>
<td>6</td>
<td>11</td>
<td>18</td>
<td>27</td>
</tr>
</tbody>
</table>

- A) linear
- B) nonlinear

Answer: B

247)

<table>
<thead>
<tr>
<th>( x )</th>
<th>-3</th>
<th>2</th>
<th>4</th>
<th>5</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y )</td>
<td>1</td>
<td>11</td>
<td>15</td>
<td>17</td>
<td>21</td>
</tr>
</tbody>
</table>

- A) linear
- B) nonlinear

Answer: A

248)

<table>
<thead>
<tr>
<th>( x )</th>
<th>-4</th>
<th>-2</th>
<th>0</th>
<th>2</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y )</td>
<td>20</td>
<td>8</td>
<td>4</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>

- A) linear
- B) nonlinear

Answer: B
Identify the slope, y-intercept, and x-intercept.

249)

A) Slope: 3; y-intercept: 2; x-intercept: -1
B) Slope: 2; y-intercept: 1; x-intercept: 2
C) Slope: 2; y-intercept: -1; x-intercept: 2
D) Slope: 2; y-intercept: 2; x-intercept: -1

Answer: D

250)

A) Slope: 3; y-intercept: 1; x-intercept: 1
B) Slope: 1; y-intercept: -1; x-intercept: -1
C) Slope: -1; y-intercept: -1; x-intercept: -1
D) Slope: -3; y-intercept: 1; x-intercept: 1

Answer: C
Write the equation of the line whose graph is shown.

251)

\begin{align*}
\text{A)} \quad y &= -\frac{7}{4}x - 7 \\
\text{B)} \quad y &= 4x - 7 \\
\text{C)} \quad y &= -4x - 7 \\
\text{D)} \quad y &= -\frac{4}{7}x - 4
\end{align*}

Answer: A

252)

\begin{align*}
\text{A)} \quad y &= \frac{5}{2}x + 5 \\
\text{B)} \quad y &= -5x - 2 \\
\text{C)} \quad y &= 5x - 2 \\
\text{D)} \quad y &= \frac{2}{5}x - 2
\end{align*}

Answer: D

253)

\begin{align*}
\text{A)} \quad y &= 3x - 5 \\
\text{B)} \quad y &= -\frac{3}{5}x - 3 \\
\text{C)} \quad y &= -3x - 5 \\
\text{D)} \quad y &= -\frac{5}{3}x - 5
\end{align*}

Answer: D
254) A) \( y = -x + 2 \)  
B) \( y = x - 2 \)  
C) \( y = -x - 2 \)  
D) \( y = x + 2 \)  
Answer: B

255) A) \( y = x + 3 \)  
B) \( y = x - 3 \)  
C) \( y = -x + 3 \)  
D) \( y = -x - 3 \)  
Answer: C

Use the given graph to find the x-intercept and the zero of the function.

256) A) \((3, 0); 3\)  
B) \((3, -6); 3\)  
C) \((-6, 0); -6\)  
D) \((0, 0); 0\)  
Answer: A
257) \[ A) (2, 0); 2 \quad B) (0, 0); 0 \quad C) (2, 1); 2 \quad D) (1, 0); 1 \]
Answer: A

258) \[ A) (5, 0); 5 \quad B) (5, -7); 5 \quad C) (-7, 0); -7 \quad D) (0, 0); 0 \]
Answer: A

Write a formula for a linear function \( f \) whose graph satisfies the conditions.

259) Slope: \( -\frac{6}{7}; \) y-intercept: \( \frac{33}{7} \)

A) \( f(x) = -\frac{6}{7}x - \frac{33}{7} \)  
B) \( f(x) = \frac{6}{7}x - \frac{33}{7} \)  
C) \( f(x) = -\frac{6}{7}x + \frac{33}{7} \)  
D) \( f(x) = \frac{6}{7}x + \frac{33}{7} \)

Answer: C

260) Slope: \( -\frac{5}{4}; \) y-intercept: 8

A) \( f(x) = -\frac{5}{4}x + 8 \)  
B) \( f(x) = \frac{5}{4}x + 8 \)  
C) \( f(x) = -\frac{5}{4}x - 8 \)  
D) \( f(x) = \frac{5}{4}x - 8 \)

Answer: A

261) Slope: \( \frac{3}{2}; \) y-intercept: -2

A) \( f(x) = \frac{3}{2}x - 2 \)  
B) \( f(x) = \frac{3}{2}x - 2 \)  
C) \( f(x) = \frac{3}{2}x + 2 \)  
D) \( f(x) = -\frac{3}{2}x + 2 \)

Answer: B
262) Slope: $\frac{1}{4}$; y-intercept: 3
   
   A) $f(x) = \frac{1}{4}x - 3$  
   B) $f(x) = \frac{1}{4}x + 3$  
   C) $f(x) = -\frac{1}{4}x - 3$  
   D) $f(x) = -\frac{1}{4}x + 3$
   
   Answer: B

263) Slope: $\frac{7}{2}$; y-intercept: -11
   
   A) $f(x) = -\frac{7}{2}x + 11$  
   B) $f(x) = -\frac{7}{2}x - 11$  
   C) $f(x) = \frac{7}{2}x - 11$  
   D) $f(x) = \frac{7}{2}x + 11$
   
   Answer: C

264) Slope: 2; passing through the origin
   
   A) $f(x) = \frac{1}{2}x$  
   B) $f(x) = 2x$  
   C) $f(x) = -2x$  
   D) $f(x) = 2$
   
   Answer: B

265) Slope: 1.2; passing through (1, 3.5)
   
   A) $f(x) = 1.2x + 2.3$  
   B) $f(x) = 1.2x + 1.9$  
   C) $f(x) = 1.2x + 3.5$  
   D) $f(x) = -1.2x + 2.6$
   
   Answer: A

Express the following in interval notation.

266) $x \geq 5$
   
   A) $(-\infty, 5]$  
   B) $[5, \infty)$  
   C) $(5, \infty)$  
   D) $(-\infty, 5)$
   
   Answer: B

267) $x < -50$
   
   A) $[-50, \infty)$  
   B) $(-\infty, -50)$  
   C) $(-50, \infty)$  
   D) $(-\infty, -50]$  
   
   Answer: B

268) $-6 < x < -5$
   
   A) $(-\infty, -6) \cup [-5, \infty)$  
   B) $(-6, -5)$  
   C) $[-6, -5]$  
   D) $(-\infty, -6) \cup (-5, \infty)$
   
   Answer: B

269) $2 < x < 10$
   
   A) $[2, 10)$  
   B) $(2, 10]$  
   C) $(2, 10)$  
   D) $[2, 10]$  
   
   Answer: A

270) $10 > x > -4$
   
   A) $(-\infty, -4) \cup (10, \infty)$  
   B) $(-\infty, -4) \cup [10, \infty)$  
   C) $(-4, 10]$  
   D) $[-4, 10)$
   
   Answer: C

271) $x \leq -6$
   
   A) $[-6, \infty)$  
   B) $(-6, \infty)$  
   C) $(-\infty, -6)$  
   D) $(-\infty, -6]$  
   
   Answer: D

272) $x > 9$
   
   A) $(-\infty, 9)$  
   B) $[9, \infty)$  
   C) $(-\infty, 9]$  
   D) $(9, \infty)$  
   
   Answer: D

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273) \( \{x \mid 10 < x\} \)
   A) \([10, \infty)\)  
   B) \((10, \infty)\)  
   C) \((-\infty, 10]\)  
   D) \((-\infty, 10)\)
   Answer: B

274) \( \{x \mid x < -5 \text{ or } x > 1\} \)
   A) \((-5, 1)\)  
   B) \([-5, 1]\)  
   C) \((-\infty, -5) \cup (1, \infty)\)  
   D) \((-\infty, -5] \cup [1, \infty)\)
   Answer: C

275) \( \{x \mid x < -5 \text{ or } x \geq -1\} \)
   A) \((-\infty, -5) \cup (-1, \infty)\)  
   B) \([-5, -1]\)  
   C) \((-5, -1]\)  
   D) \((-\infty, -5] \cup (-1, \infty)\)
   Answer: A

276)

   A) \([2, \infty)\)  
   B) \((-\infty, 2)\)  
   C) \((-\infty, 2]\)  
   D) \((2, \infty)\)
   Answer: D

277)

   A) \((-\infty, 1)\)  
   B) \([1, \infty)\)  
   C) \((-\infty, 1]\)  
   D) \((1, \infty)\)
   Answer: C

278)

   A) \([-2, 2]\)  
   B) \([-2, 2)\)  
   C) \((-2, 2]\)  
   D) \((-2, 2)\)
   Answer: C

279)

   A) \((0, 4]\)  
   B) \((-4, 0]\)  
   C) \([0, 4)\)  
   D) \([-4, 0)\)
   Answer: D

280)

   A) \([-2, 2]\)  
   B) \([-2, 2)\)  
   C) \((-2, 2]\)  
   D) \((-2, 2)\)
   Answer: C

281)

   A) \((0, 4]\)  
   B) \((-4, 0]\)  
   C) \([-4, 0]\)  
   D) \([0, 4)\)
   Answer: D
282)

A) \((\infty, -1) \cup (3, \infty)\)  
B) \([-1, 3]\)  
C) \((-1, 3)\)  
D) \((-\infty, -1) \cup [3, \infty)\)

Answer: A

283)

A) \((-\infty, -2) \cup (2, \infty)\)  
B) \((-2, 2)\)  
C) \([-2, 2]\)  
D) \((-\infty, -2) \cup [2, \infty)\)

Answer: D

284)

A) \((-\infty, -4) \cup (0, \infty)\)  
B) \((-\infty, -4) \cup [0, \infty)\)  
C) \([-4, 0)\)  
D) \((-\infty, -4) \cup (0, \infty)\)

Answer: D

285)

A) \((-\infty, 0) \cup [4, \infty)\)  
B) \((-\infty, 0) \cup (4, \infty)\)  
C) \((-\infty, 0) \cup (4, \infty)\)  
D) \((0, 4]\)

Answer: A

Use the graph of f to determine the intervals where f is increasing and where f is decreasing.

286)

A) increasing: \((-\infty, 0]\); decreasing \([0, \infty)\)  
B) increasing: \((-\infty, -5]\); decreasing \([-5, \infty)\)  
C) increasing: \((-\infty, \infty]\); decreasing: never  
D) increasing: \([-5, \infty]\); decreasing \((-\infty, -5]\)

Answer: D
287) 

A) increasing: never; decreasing: $(-\infty, \infty)$  
B) increasing: $(-\infty, \infty)$; decreasing: never  
C) increasing: $(-\infty, 0]$; decreasing $[0, \infty)$  
D) increasing: $[0, \infty)$; decreasing $(-\infty, 0]$  
Answer: D

288) 

A) increasing: $[0, \infty)$; decreasing $(-\infty, 0]$  
B) increasing: $(-\infty, \infty)$; decreasing: never  
C) increasing: never; decreasing: $(-\infty, \infty)$  
D) increasing: $(-\infty, 0]$; decreasing $[0, \infty)$  
Answer: D
289)

A) increasing: \((-\infty, 0]\); decreasing \([0, \infty)\)
B) increasing: \((-\infty, \infty)\); decreasing: never
C) increasing: \((-\infty, 2]\); decreasing \([2, \infty)\)
D) increasing: \([2, \infty)\); decreasing \((-\infty, 2]\)

Answer: C

290)

A) increasing: \((-\infty, \infty)\); decreasing: never
B) increasing: \((-\infty, 0]\); decreasing \([0, \infty)\)
C) increasing: never; decreasing: \((-\infty, \infty)\)
D) increasing: \([0, \infty)\); decreasing \((-\infty, 0]\)

Answer: A
Identify where $f$ is increasing and where $f$ is decreasing.

293) $f(x) = 2$

A) increasing: $[2, \infty)$; decreasing: never
B) increasing: $(-\infty, \infty)$; decreasing: never
C) neither
D) increasing: $(-\infty, \infty)$; decreasing: never

Answer: C

294) $f(x) = 5x - 4$

A) increasing: never; decreasing: $(-\infty, \infty)$
B) increasing: $[-4, \infty)$; decreasing: $(-\infty, -4]$
C) neither
D) increasing: $(-\infty, \infty)$; decreasing: never

Answer: D
295) \( f(x) = -3x + 2 \)
   A) neither
   C) increasing: \((-\infty, \infty)\); decreasing: never
   D) increasing: never; decreasing: \((-\infty, \infty)\)

Answer: D

296) \( f(x) = x^2 + 3 \)
   A) increasing: \((-\infty, \infty)\); decreasing: never
   B) increasing: \([3, \infty)\); decreasing: never
   C) increasing: \((-\infty, 0]\); decreasing \([0, \infty)\)
   D) increasing: \([0, \infty)\); decreasing \((-\infty, 0]\)

Answer: D

297) \( f(x) = 6x - x^2 \)
   A) increasing: \([-3, \infty)\); decreasing \([-3, \infty)\)
   B) increasing: \([6, \infty)\); decreasing \((-\infty, 6]\)
   C) increasing: \([-\infty, 6] \); decreasing \([6, \infty)\)
   D) increasing: \([-\infty, 3] \); decreasing \([-3, \infty)\)

Answer: A

298) \( f(x) = x^2 + 2x \)
   A) increasing: \([-2, \infty)\); decreasing \([-2, \infty)\)
   B) increasing: \([-1, \infty)\); decreasing \((-\infty, -1]\)
   C) increasing: \([-\infty, -1] \); decreasing \([-1, \infty)\)
   D) increasing: \([-1, \infty)\); decreasing \((-\infty, -1]\)

Answer: B

299) \( f(x) = \sqrt{x - 8} \)
   A) increasing: \([8, \infty)\); decreasing: never
   B) increasing: \([-8, \infty)\); decreasing: never
   C) increasing: never; decreasing: \([-8, \infty)\)
   D) increasing: never; decreasing: \([8, \infty)\)

Answer: A

300) \( f(x) = -\sqrt{x + 8} \)
   A) increasing: never; decreasing: \([8, \infty)\)
   B) increasing: \([-8, \infty)\); decreasing: never
   C) increasing: never; decreasing: \([-8, \infty)\)
   D) increasing: \([8, \infty)\); decreasing: never

Answer: C

301) \( f(x) = |x - 7| \)
   A) increasing: \((-\infty, -7]\); decreasing: \([-7, \infty)\)
   B) increasing: \((-\infty, 7]\); decreasing: \([7, \infty)\)
   C) increasing: \([-7, \infty) \); decreasing: \((-\infty, -7]\)
   D) increasing: \([7, \infty) \); decreasing: \((-\infty, 7]\)

Answer: D

302) \( f(x) = |x + 4| \)
   A) increasing: \((-\infty, -4]\); decreasing: \([-4, \infty)\)
   B) increasing: \((-\infty, 4]\); decreasing: \([4, \infty)\)
   C) increasing: \([-4, \infty) \); decreasing: \((-\infty, -4]\)
   D) increasing: \([4, \infty) \); decreasing: \((-\infty, 4]\)

Answer: C

Identify where \( f \) is increasing or where \( f \) is decreasing, as indicated. Round your answer to two decimal places when appropriate.

303) \( f(x) = -6x^2 + 24x \); increasing
   A) \([2, \infty)\)
   B) \((-\infty, -2]\)
   C) \([-2, \infty)\)
   D) \((-\infty, 2]\)

Answer: D

304) \( f(x) = -3x^2 + 6x - 1 \); decreasing
   A) \((-\infty, 1]\)
   B) \((-\infty, -1]\)
   C) \([-1, \infty)\)
   D) \([1, \infty)\)

Answer: D
305) \( f(x) = |5x - 4| \); increasing
A) \((\infty, 0.80]\) B) \([-0.80, 0.80]\) C) \([0.80, \infty)\) D) \((\infty, \infty)\)
Answer: C

306) \( f(x) = x^3 - 4x - 7 \); decreasing
A) \([-2.00, 2.00]\) B) \((\infty, -1.15) \cup [1.15, \infty)\)
C) \((\infty, -1.15]\) D) \([-1.15, 1.15]\)
Answer: D

307) \( f(x) = x^4 - 10x^2 + 16 \); decreasing
A) \((\infty, -2.83) \cup (-1.41, 1.41) \cup (2.83, \infty)\) B) \((-2.83, -1.41) \cup (1.41, 2.83)\)
C) \((-2.24, 0) \cup (2.24, \infty)\) D) \((\infty, -2.24) \cup (0, 2.24)\)
Answer: D

Use the graph and formula for \( f(x) \) to find the average rates of change of \( f \) from \(-4\) to \(-1\) and from \(1\) to \(4\).

308) \( f(x) = \frac{3}{x} \)

A) 3; -3 B) 3; 3 C) 0; 0 D) -3; -3
Answer: C

309) \( f(x) = 2x - 4 \)

A) -2; 2 B) -2; -2 C) 4; 4 D) 2; 2
Answer: D
310) \( f(x) = -4x + 1 \)

Answer: A

311) \( f(x) = 0.4x^2 - 3 \)

Answer: A

312) \( y = -0.4x^2 + 3 \)

Answer: C
Compute the average rate of change of \( f \) from \( x_1 \) to \( x_2 \). Round your answer to two decimal places when appropriate. Interpret your result graphically.

313) \( f(x) = 6x + 4, x_1 = -4 \) and \( x_2 = -1 \)

A) 7; the slope of the line passing through \((-4, f(-4))\) and \((-1, f(-1))\) is 7.
B) 5; the slope of the line passing through \((-4, f(-4))\) and \((-1, f(-1))\) is 5.
C) 6; the slope of the line passing through \((-4, f(-4))\) and \((-1, f(-1))\) is 6.
D) 8; the slope of the line passing through \((-4, f(-4))\) and \((-1, f(-1))\) is 8.

Answer: C

314) \( f(x) = -3x + 3, x_1 = -6 \) and \( x_2 = -3 \)

A) -4; the slope of the line passing through \((-6, f(-6))\) and \((-3, f(-3))\) is -4.
B) 3; the slope of the line passing through \((-6, f(-6))\) and \((-3, f(-3))\) is 3.
C) -3; the slope of the line passing through \((-6, f(-6))\) and \((-3, f(-3))\) is -3.
D) 2; the slope of the line passing through \((-6, f(-6))\) and \((-3, f(-3))\) is 2.

Answer: C

315) \( f(x) = x^3 - 4x, x_1 = 2 \) and \( x_2 = 4 \)

A) 8; the slope of the line passing through \((2, f(2))\) and \((4, f(4))\) is 8.
B) 24; the slope of the line passing through \((2, f(2))\) and \((4, f(4))\) is 24.
C) -8; the slope of the line passing through \((2, f(2))\) and \((4, f(4))\) is -8.
D) -24; the slope of the line passing through \((2, f(2))\) and \((4, f(4))\) is -24.

Answer: B

316) \( f(x) = \sqrt[3]{3x - 1}, x_1 = 1 \) and \( x_2 = 3 \)

A) 0.58; the slope of the line passing through \((1, f(1))\) and \((3, f(3))\) is 0.58.
B) -0.58; the slope of the line passing through \((1, f(1))\) and \((3, f(3))\) is -0.58.
C) -0.71; the slope of the line passing through \((1, f(1))\) and \((3, f(3))\) is -0.71.
D) 0.71; the slope of the line passing through \((1, f(1))\) and \((3, f(3))\) is 0.71.

Answer: D

Complete the following for the given \( f(x) \).

(i) Find \( f(x + h) \).
(ii) Find the difference quotient of \( f \) and simplify.

317) \( f(x) = -4 \)

A) (i) \( h - 4 \)  B) (i) \(-4\)  C) (i) \( h - 4 \)  D) (i) \(-4\)
(ii) \( h \)  (ii) \(-4\)  (ii) \( 0 \)  (ii) \( 0 \)

Answer: D

318) \( f(x) = -9x \)

A) (i) \(-9x - 9h\)  B) (i) \(-9x + 9h\)  C) (i) \(-9x + 9h\)  D) (i) \(-9x - 9h\)
(ii) \( 9 \)  (ii) \(-9\)  (ii) \( 9 \)  (ii) \(-9\)

Answer: D

319) \( f(x) = 2x - 11 \)

A) (i) \( 2x + 2h - 11\)  B) (i) \( 2x + 2h - 11\)  C) (i) \( 2x + 2h - 11\)  D) (i) \( 2x + h - 11\)
(ii) \( 2 \)  (ii) \(-2\)  (ii) \( 11 \)  (ii) \( 2 \)

Answer: A
320) \( f(x) = x^2 + 2x \)
   A) (i) \( x^2 + 2xh + h^2 + 2x + 2h \)
   (ii) \( 2xh + h + 2 \)
   C) (i) \( x^2 + 2xh + h^2 + 2x + 2h \)
   (ii) \( 2x + h + 2 \)
   B) (i) \( x^2 + h^2 + 2x + 2h \)
   (ii) \( h + 2 \)
   D) (i) \( x^2 + 2xh + h^2 + 2x + h \)
   (ii) \( 2x + h + 1 \)
   Answer: C

321) \( f(x) = 6x^2 + 9x - 9 \)
   A) (i) \( 6x^2 + 12xh + 6h^2 + 9x + 9h - 9 \)
   (ii) \( 12xh + 9h + 6h^2 \)
   C) (i) \( 6x^2 + 12xh + 6h^2 + 9x + 9h - 9 \)
   (ii) \( 12x + 6h + 9 \)
   B) (i) \( 6x^2 + 12xh + 6h^2 + 9x - 9 \)
   (ii) \( 12x + 9 \)
   D) (i) \( 6x^2 + 6xh + 6h^2 + 9x + 9h - 9 \)
   (ii) \( 6x + 6 + 12h \)
   Answer: C

Solve the problem.

322) The profit (in millions of dollars) for Allied Manufacturing can be approximated by \( f(x) = 0.342x - 509.2 \), where \( x \) is the year \( 1989 \leq x \leq 2009 \). Approximate the average rate of change over a 7–year period. Round your answer to three decimal places when appropriate.
   A) 2.394 million dollars
   B) 1.894 million dollars
   C) 4.404 million dollars
   D) 3.964 million dollars
   Answer: A

323) The profit (in millions of dollars) for Allied Manufacturing can be approximated by \( f(x) = -0.225x + 910.2 \), where \( x \) is the year \( 1989 \leq x \leq 2009 \). Approximate the average rate of change over a 3–year period. Round your answer to three decimal places when appropriate.
   A) -6.285 million dollars
   B) 0.135 million dollars
   C) -0.675 million dollars
   D) -0.885 million dollars
   Answer: C

324) The following table gives the outside temperature in degrees Fahrenheit on a winter day in Death Valley, California.

<table>
<thead>
<tr>
<th>Time</th>
<th>7:00 am</th>
<th>8:00 am</th>
<th>9:00 am</th>
<th>10:00 am</th>
<th>11:00 am</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature (°F)</td>
<td>78</td>
<td>82</td>
<td>85</td>
<td>91</td>
<td>95</td>
</tr>
</tbody>
</table>

Calculate the average rate of change in temperature between 8:00 am and 11:00 am. Round your answer to two decimal places when appropriate.
   A) 4.64°F
   B) 4.33°F
   C) 3.26°F
   D) 5.36°F
   Answer: B

83
325) The distance D in feet that an object has fallen after t seconds is given by \( D(t) = 16t^2 \).
   (i) Evaluate \( D(2) \) and \( D(5) \).
   (ii) Calculate the average rate of change of \( D \) from 2 to 5. Interpret the result.
   A) (i) 32, 80
      (ii) 112; the object's average speed from 2 to 5 seconds is 112 ft/sec.
   B) (i) 64, 400
      (ii) 112; the object's average speed from 2 to 5 seconds is 112 ft/sec.
   C) (i) 64, 400
      (ii) 48; the object’s average speed from 2 to 5 seconds is 48 ft/sec.
   D) (i) 32, 80
      (ii) 48; the object’s average speed from 2 to 5 seconds is 48 ft/sec.
   Answer: B

326) Let the number of gallons G of water drained from a pool after t hours be given by \( G(t) = 4375 - 175t \) for
   \( 0 \leq t \leq 25 \).
   (i) Find \( G(t + h) \).
   (ii) Find the difference quotient. Interpret your result.
   A) (i) \( 4375 - 175t + 175h \)
      (ii) \(-175\); the pool is being emptied at a constant rate of 175 gal/hr.
   B) (i) \( 4375 - 175t - 175h \)
      (ii) \(-175\); the pool is being emptied at a constant rate of 175 gal/hr.
   C) (i) \( 4375 - 175t + h \)
      (ii) 1; the pool is being emptied at a constant rate of 1 gal/hr.
   D) (i) \( 4375 - 175t + 175h \)
      (ii) 175; the pool is being emptied at a constant rate of 175 gal/hr.
   Answer: B