1. After 10 minutes, half the amount of a certain medicine leaves a person's bloodstream. If Sadie takes 100 mg of the medicine, how much of the medicine is left in her bloodstream after 30 minutes?

2. The half-life of a substance is 15 years. If there are 100 g of the substance present now, how many grams of the substance will be present in 10 years?

For questions 3 and 4, the half-life of carbon-14 is 5730 years.

3. Talia found a dinosaur bone at an archeological site. A carbon-14 test showed that the bone is 20,000 years old. What percent of the original carbon-14 remains in the bone?

4. What percent of carbon-14 remains in a fossil that is 1204 years old?

1. Alessandra invested $2500 into a bank account that earns 3% compounded annually. Which expression represents the balance in Alessandra's account after y years?

    a. $2500 \cdot 1.03^y$ c. $2500 \cdot 3^y$

    b. $2500 \cdot 1.03y$ d. $2500 + 3^y$

2. A certain bacteria population doubles every two minutes. If there are 500 bacteria now, how many bacteria will there be in 9 minutes?

    a. $500 \cdot$ ‾   c. $500 \cdot 9^2$

    b. $500 \cdot 2^9$ d. $500 \cdot 9 \cdot 2$

3. Which of the following is equivalent to   ‾ ?

    a. ⎯⎯   c.

    b. ⎯⎯   d.

4. For which value of x is ‾ $= 16$?

    a. 2   c. 12

    b. 8   d. 40

5. The half-life of a certain radioactive substance is 120 years. Approximately what percent of the substance remains in a 320-year-old sample?

    a. 16%   c. 50%

    b. 32%   d. 77%

6. Mandy invested $3000 into a bank account that earns 2% compounded annually. What will be the balance in Mandy's account after 14 years?

    a. $3840   c. $3958

    b. $3898   d. $4201

7. A certain bacteria population triples every 30 seconds. If there are 20 bacteria now, how many bacteria will there be in 2 minutes?

    a. $20 \cdot 3^4$ c. $3 \cdot 20^4$

    b. $20 \cdot 4^3$ d. $4 \cdot 20^3$

8. Which of the following is equivalent to ‾ ?

    a. ‾=   c.

    b. ‾   d. ‾

9. For which value of p is ‾ ?

    a. 2   c. 24

    b. 8   d. 512

10. The half-life of a certain medicine in the bloodstream is 5 hours. Approximately what percent of the medicine will remain in the bloodstream after 4 hours?

    a. 21%   c. 50%

    b. 42%   d. 57%

11. The growth of a bacteria population follows the function $(x) = 100 \cdot 1.24^x$. Explain how you can use a graph to determine when the bacteria population will reach 10,000.

1. What is the domain of the relation (0, 2), (1, 4), (3, 3), (–4, 5)?
      a. {4}   c. {–4, 0, 1, 3}
      b. {–4, 0, 1, 2, 3, 5}   d. {2, 3, 4, 5}

2. Which relation represents a function?
      a. (1, 3), (3, 5), (1, 4), (–1, 6)   c. (4, 4), (5, 5), (4, –10)
      b. (5, 1), (–4, 1), (5, 2)   d. (–5, 8), (4, 12), (8, 12), (–10, 9)

3. What type of polynomial function is   –   ?
      a. cubic   c. quadratic
      b. quartic   d. quintic

4. The graph of a quadratic equation is what shape?
      a. parabola   c. slope
      b. line   d. circle

5. What is the degree of the polynomial expression   –   ?
      a. 1   c. 5
      b. 3   d. 9

1. What is the range of the relation (0, 2), (1, 4), (3, 3), (–4, 5)?
      a. {4}   c. {–4, 0, 1, 3}
      b. {–4, 0, 1, 2, 3, 5}   d. {2, 3, 4, 5}

2. Which relation represents a function?
      a. (2, 3), (3, 5), (1, 4), (2, 6)   c. (4, 4), (4, 5), (4, –10)
      b. (5, 3), (–4, 1), (–5, 2)   d. (–5, 8), (4, 12), (4, 12), (–10, 9)

3. What type of polynomial function is   –   – ?
      a. quadratic   c. quintic
      b. quartic   d. cubic

4. What type of polynomial expression is   ?
      a. monomial   c. trinomial
      b. binomial   d. octonomial

5. What is the degree of the polynomial expression –   –   ?
       a. 4   c. 7
       b. 6   d. 10

6. The graph of a linear function has what shape?
       a. parabola   c. wave
       b. hyperbola   d. line

7. What is the leading coefficient for   –   ?
       a. –2   c. 5
       b. 1   d. 21

8. A quintic function has what degree?
       a. 2   c. 4
       b. 3   d. 5

9. A quadratic function has what degree?
       a. 2   c. 4
       b. 3   d. 5

10. Which expression is a quartic function?
       a.   –   c.   –   –
       b.   –   d.

11. Sketch a graph that represents a quintic function.

1. Is   odd, even, both, or neither?
       a. odd   c. both
       b. even   d. neither

2. An even function has what type of symmetry?
       a. symmetric through the origin   c. symmetric about the y-axis
       b. symmetric about the x-axis   d. no symmetry

3. What is the degree of the polynomial for   ?
   a. 2   c. 5
       b. 4   d. 7

4. What is the absolute maximum for the following graph?

a. (1.5, 2)   c. (-2, -2)
b. (0, 0)   d. no absolute maximum
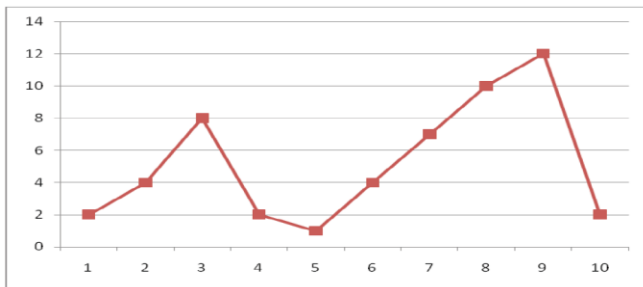
5. How many turning points are in the graph below?

a. 1   c. 4
b. 2   d. infinity

1. Is   odd, even, both, or neither?
   a. odd   c. both
   b. even   d. neither

2. An odd function has what type of symmetry?
   a. symmetric through the origin   c. symmetric about the y-axis
   b. symmetric about the x-axis   d. no symmetry

3. What are the zeros for   –   ?
   a. (0, 2)   c. (-2.58, 0), (1.43, 0)

b. (−1.43, 0)   d. (0, 0), (2.58, −1.43)

4. What is the relative minimum for the following graph?
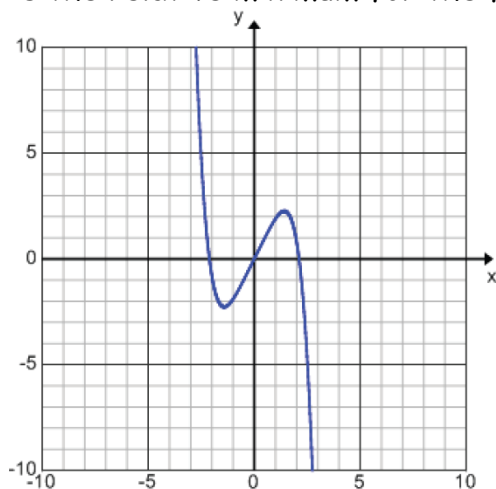
a. (1.5, 2)   c. (−1.5, −2)
b. (0, 0)   d. no relative minimum

5. How many turning points are in the graph below?
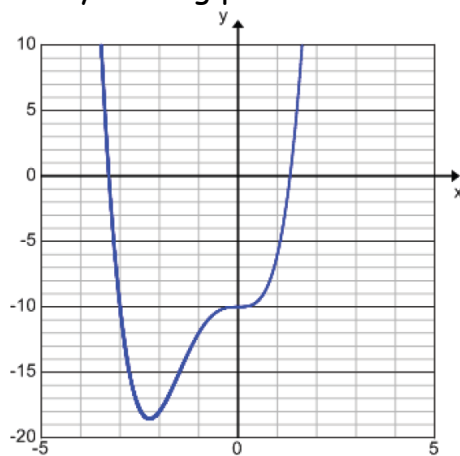
a. 1   c. 4
b. 2   d. infinity

6. What is the end behavior for the function   ?
    a. The left side has an absolute maximum.
    b. The right side has an absolute minimum.
    c. The left side and right side have relative minima
    d. The left side extends into positive infinity and the right side extends into positive infinity.

7. What is the range for the graph below?

a. $1 \le x \le 12$ c. $1 \le y \le 10$
b. $1 \le y \le 12$ d. $1 \le x \le 10$

8. How many turning points are shown on the graph below?
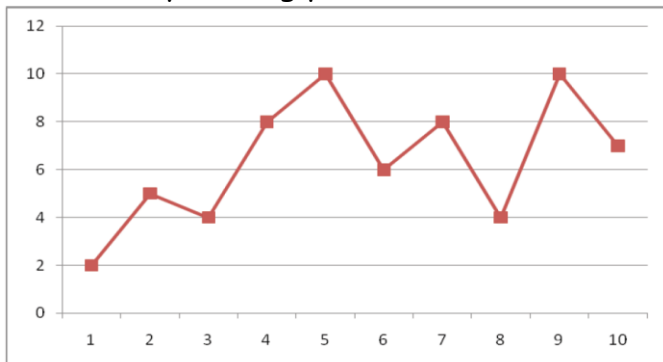
a. 4   c. 8
b. 7   d. 10

9. Which function only has an absolute maximum?
a.   c.   –
b.   d.   –

10. What are the intervals of increase for the graph below?
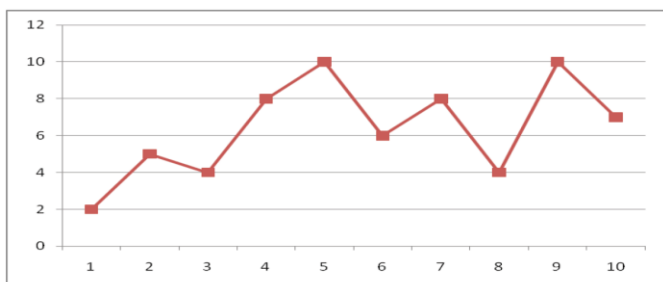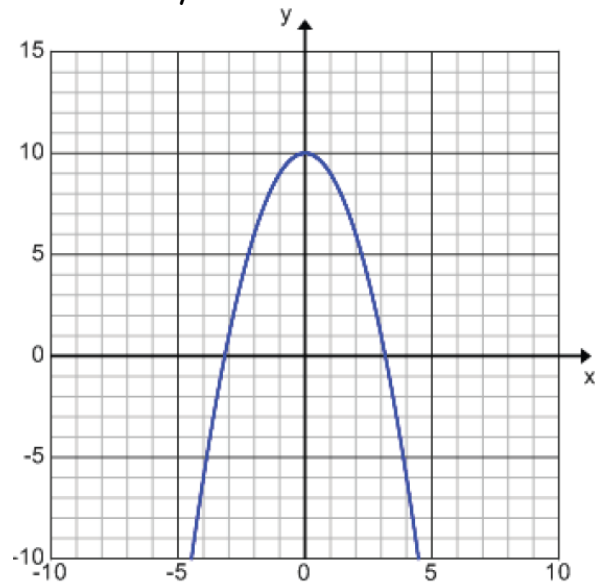

a. [1, 2], [3, 5], [6, 7], [8, 9]   c. [2, 3], [6, 7], [9, 10]
b. [2, 3], [5, 6], [7, 8], [9, 10]   d. [1, 1], [2, 2], [7, 7], [8, 8]

1. What is the definition for the zero of a polynomial function?
       a. The zeros occur at (0, 0).
       b. The zeros occur where *x* equals zero.
       c. The zeros occur at *y*-values that make the function equal to zero.
       d. The zeros occur at *x*-values that make the function equal to zero.
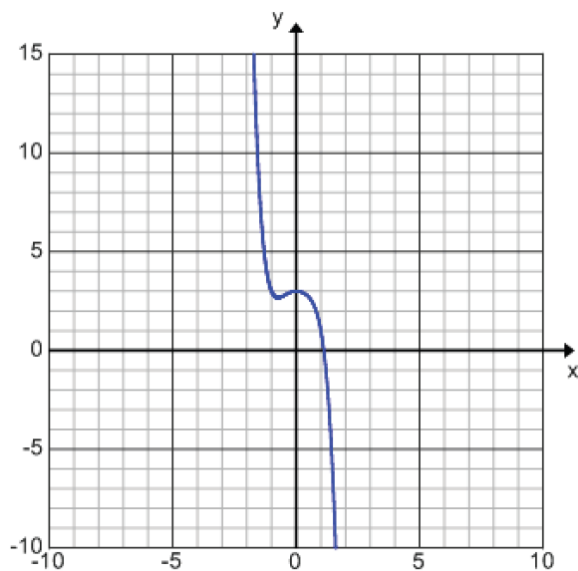
2. How many zeros are shown in the following graph?

       a. –1   c. 1
       b. 0   d. 2

3. How many zeros are shown in the following graph?
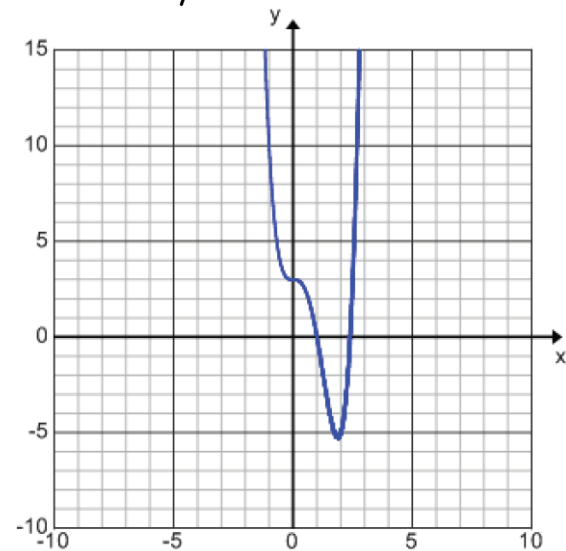
       a. 0   c. 2
       b. 1   d. infinity

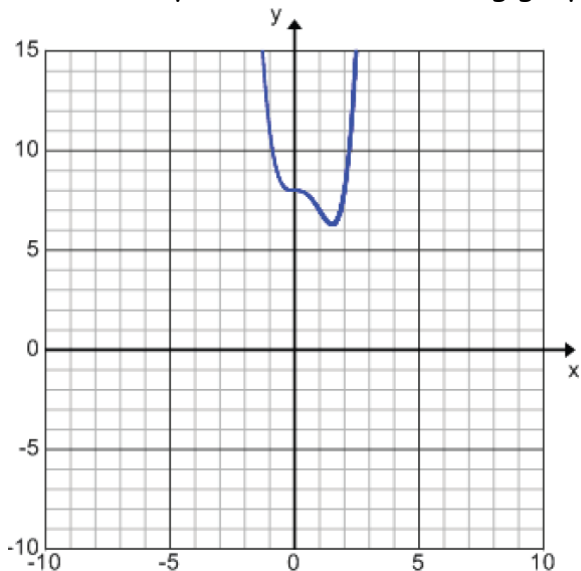4. What are the zeros for the function graphed below?

a. about (0, –1)   c. about (1.5, 4)
b. about (–1, 2) and (2, –1)   d. about (–1, 0) and (2, 0)

5. How can you shift the following graph to create zeros?

a. shift the polynomial 4 units down   c. shift the polynomial 4 units left
b. shift the polynomial 4 units up   d. shift the polynomial 4 units right

1. What is the reason that some polynomials in the real world do not have zeros?
     a. There are no values of x that would make the function equal zero.
     b. There are no values of y that would make the function equal zero.
     c. There are no values of x that equal y.
     d. Real-world polynomials never have both negative and positive values.

2. How many zeros are shown in the graph?

    a. 0 c. 2

    b. 1 d. 3

3. How many zeros are shown in the graph?

    a. 1 c. 3

    b. 2 d. 4

4. What are the zeros for the function graphed below?

a. about (0, 1) c. about (0, 3)

b. about (1, 0) d. about (3, 0)

5. How can you shift the following graph to create zeros?

a. Shift the polynomial 7 units down. c. Shift the polynomial 7 units left.

b. Shift the polynomial 3 units up. d. Shift the polynomial 4 units right.

Use the following real-world situation and graph to answer problems 6–11.

Tonya sells crafts at craft fairs. It costs her money to make the crafts and have a booth at each craft fair. Sometimes she sells crafts and makes a profit. Other times she sells crafts, but not enough to make a profit, in which case she has a loss. Sometimes she breaks even. The graph below shows net profit/loss for 10 craft shows last year.

6. What do the zeros represent in this real-world situation?

a. net profit c. break even

b. net loss d. pure profit

7. How many zeros are in the graph?

a. –3 c. 6

b. 3 d. 10

8. What is a feasible range for this function?

a. $0 to $100 c. –$1000 to $1000

b. –$100 to –$50 d. –$50 to $100

9. Between what two craft shows did the amount Tonya made decrease the most?

a. show 1 and show 2 c. show 6 and show 7

b. show 2 and show 3 d. show 7 and show 8

10. At which craft shows did Tonya make a profit?

a. shows 1, 2, 3, 4, and 7 c. shows 1, 3, 6, and 9

b. shows 2, 4, 5, 7, 8, and 10 d. shows 5, 7, and 10

11. Tonya's goal is to make a net profit at each craft show. Would Tonya want zeros to appear on the graph of her net profits? Would Tonya want negative numbers on the graph of her net profits? Explain your answers.

1. In the 3-D coordinate system, which number represents z in the ordered triple: (1, 5, –2)?

a. 1

b. 5

c. –2

d. 4

2. What is the ordered triple for the plot below?

10 ! 6 2

y

z

x

2 ! 6! 10

10

6

2

a. (9, 4, 12)

b. (4, 12, 9)

c. (12, 9, 4)

d. (4, 9, 12)

3. What is the distance between (1, 5) and (–2, –8) in the 2-D coordinate system?

a. 3 units

b. 13.34 units

c. 113.78 units

d. 178 units

4. The distance between two points in 2-D space can be found using which formula?

a. $d = (x - x) + (y - y) 2 1$

2

2 1

2

b. $d = (x - x) + (y - y) 2 1$

2

2 1

2

c. $d = (x - x) + (y - y) + (z - z) 1 2$

2

1 2

2

1 2

2

d. $d = (x - x) + (y - y) + (x - x) + (y - y) 2 1$

2

2 1

2

2 1

2

2 1

2

5. What is the distance between (1, 4, 3) and (–2, 4, 7) in the 3-D coordinate system?

a. 1.21 units

b. 5 units

c. 19 units

d. 25 units

1. In the 3-D coordinate system, which number represents x in the ordered triple (4, –10, 7)?

a. 4 c. 10

b. –10 d. 7

2. What is the ordered triple for the plot below?

5 ! 3 1

5

3

1

y

z

x

1 ! 3! 5

a. (4, 2, 5) c. (–4, 2, 5)

b. (2, –4, 5) d. (5, 4, 2)

3. The distance between two points in 3-D space can be found using which formula?

a. $d = (x - x) + (y - y) 2 1$

2

2 1

2

b. $d = (x - x) + (y - y) 2 1$

2

2 1

2

c. $d = (x - x) + (y - y) + (z - z) 1 2$

2

1 2

2

1 2

2

d. $d = (x - x) + (y - y) + (x - x) + (y - y) 2 1$
2
2 1
2
2 1
2
2 1
2

4. What is the distance between (2, 5, 1) and (8, 8, 10) in the 3-D coordinate system?
a. 2 units c. 121 units
b. 11.22 units d. 221.22 units
5. What is the distance between (–2, –10, –9) and (–4, –8, –7) in the 3-D coordinate system?
a. –2.34 units c. 3.46 units
b. 1.22 units d. 16 units
6. Which theorem do you use in the distance formula?
a. Kepler c. Ohm
b. Pythagorean d. Square
7. What is the ordered triple for the plot below?
10
6
2
10 ! 6 2
y
z
x
2 ! 6! 10
a. (–12, –10, –5) c. (–12, –10, –5)
b. (0, –12, 0) d. (–10, –12, –5)

8. How many "pieces" are there in the three-dimensional coordinate system?
a. 1 c. 6
b. 4 d. 8
9. A rectangular box has width = 2 inches, length = 5 inches, and height = 8 inches. What is the
distance of the diagonal between the lower-left corner of the box and the upper-right corner on
the other side of the box?
a. 7 inches c. 18.2 inches
b. 9.64 inches d. 93 inches
10. What is the distance between the points (100, 200, 50) and (–77, 14, 91) in the 3-D
coordinate

system?

a. 54.7 units c. 260.01 units

b. 131.6 units d. 306.22 units

11. How do you use the Pythagorean theorem to find the distance between two points in the 3-D coordinate system?

1) What is the domain of the relation (0, 2), (1, 4), (3, 3), (–4, 5)?

        a. {4}   c. {–4, 0, 1, 3}

        b. {–4, 0, 1, 2, 3, 5}   d. {2, 3, 4, 5}

2) Which relation represents a function?

        a. (1, 3), (3, 5), (1, 4), (–1, 6)   c. (4, 4), (5, 5), (4, –10)

        b. (5, 1), (–4, 1), (5, 2)   d. (–5, 8), (4, 12), (8, 12), (–10, 9)

3) What type of polynomial function is $y = x^4 + x^2 - x + 4$?

        a. cubic   c. quadratic

        b. quartic   d. quintic

4) The graph of a quadratic equation is what shape?

        a. parabola   c. slope

        b. line   d. circle

5) What is the degree of the polynomial expression $x^5 + 3x^3 - 7x + 8$?

        a. 1   c. 5

        b. 3   d. 9

6) What is the range of the relation (0, 2), (1, 4), (3, 3), (–4, 5)?

        a. {4}   c. {–4, 0, 1, 3}

        b. {–4, 0, 1, 2, 3, 5}   d. {2, 3, 4, 5}

7) Which relation represents a function?

        a. (2, 3), (3, 5), (1, 4), (2, 6)   c. (4, 4), (4, 5), (4, –10)

        b. (5, 3), (–4, 1), (–5, 2)   d. (–5, 8), (4, 12), (4, 12), (–10, 9)

8) What type of polynomial function is $y = 4x^5 + x^3 - 5x^2 - 8$?

        a. quadratic   c. quintic

        b. quartic   d. cubic

9) What type of polynomial expression is $4x^2$?

        a. monomial   c. trinomial

        b. binomial   d. octonomial

10) What is the degree of the polynomial expression $-2x^4 + x^2 - 5x + 10$?

        a. 4   c. 7

        b. 6   d. 10

11) The graph of a linear function has what shape?
        a. parabola   c. wave
        b. hyperbola   d. line

12) What is the leading coefficient for $5x^4 + x^2 - 2x + 21$?
        a. −2   c. 5
        b. 1   d. 21

13) A quintic function has what degree?
        a. 2   c. 4
        b. 3   d. 5

14) A quadratic function has what degree?
        a. 2   c. 4
        b. 3   d. 5

15) Which expression is a quartic function?
        a. $x^4 + x^2 - 2x$ c. $5x^3 + x^2 - 2x - 3$
        b. $5x^5 + 3x^2 - 2x$ d. $x^3 + 5$

16) Is $y = 2x^5$ odd, even, both, or neither?
        a. odd   c. both
        b. even   d. neither

17) An even function has what type of symmetry?
        a. symmetric through the origin   c. symmetric about the y-axis
        b. symmetric about the x-axis   d. no symmetry

18) What is the degree of the polynomial for $f(x) = 4x^5 + 2x^2 + 5$?
        a. 2   c. 5
        b. 4   d. 7
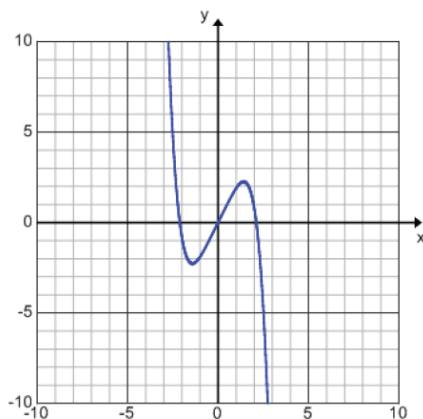
19) What is the absolute maximum for the following graph?

a. (1.5, 2)   c. (-2, -2)
b. (0, 0)   d. no absolute maximum
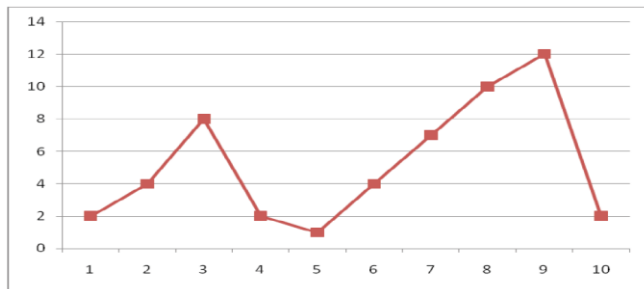
20) How many turning points are in the graph below?
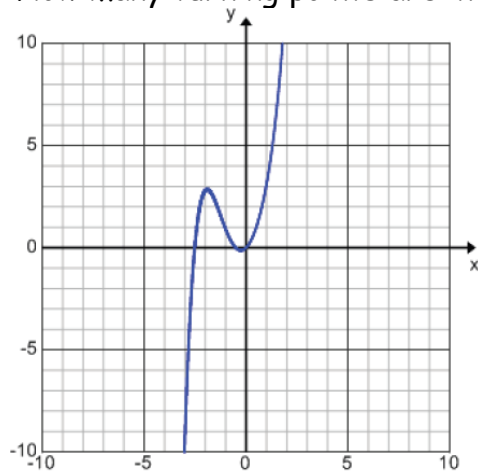
a. 1   c. 4
b. 2   d. infinity

21) Is $y = 4x^6$ odd, even, both, or neither?

a. odd   c. both
b. even   d. neither

22) An odd function has what type of symmetry?

a. symmetric through the origin   c. symmetric about the y-axis
b. symmetric about the x-axis   d. no symmetry

23) What are the zeros for $f(x) = x^4 + 2x^3 - 10$?

a. (0, 2)   c. (-2.58, 0), (1.43, 0)
b. (-1.43, 0)   d. (0, 0), (2.58, -1.43)
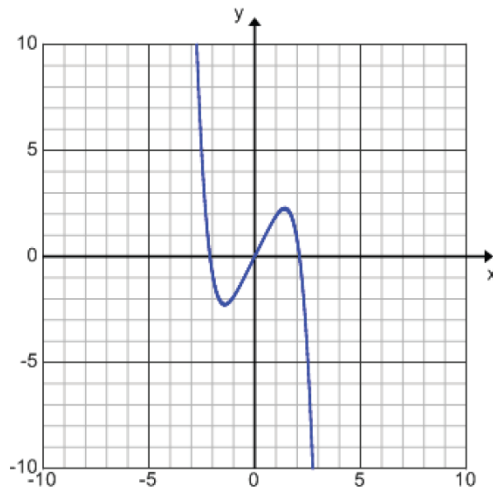
24) What is the relative minimum for the following graph?

a. (1.5, 2)   c. (–1.5, –2)
b. (0, 0)   d. no relative minimum

25) How many turning points are in the graph below?
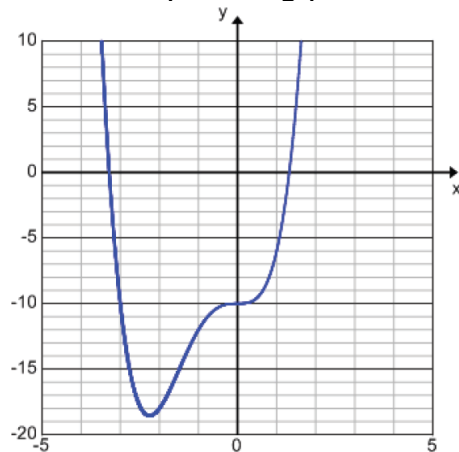
a. 1   c. 4
b. 2   d. infinity

26) What is the end behavior for the function $f(x) = x^2$?
    a. The left side has an absolute maximum.
    b. The right side has an absolute minimum.
    c. The left side and right side have relative minima
    d. The left side extends into positive infinity and the right side extends into positive infinity.

27) What is the range for the graph below?

a. $1 \le x \le 12$ c. $1 \le y \le 10$

b. $1 \le y \le 12$ d. $1 \le x \le 10$

28) How many turning points are shown on the graph below?
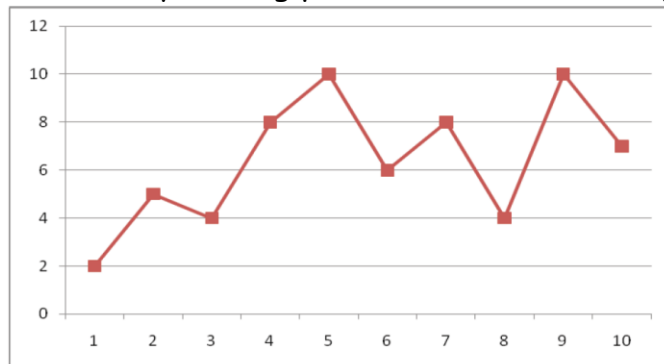
a. 4   c. 8

b. 7   d. 10

29) Which function only has an absolute maximum?

a. $f(x) = x^3$ c. $f(x) = -x^4$

b. $f(x) = x^4$ d. $f(x) = -x^5$

30) What are the intervals of increase for the graph below?
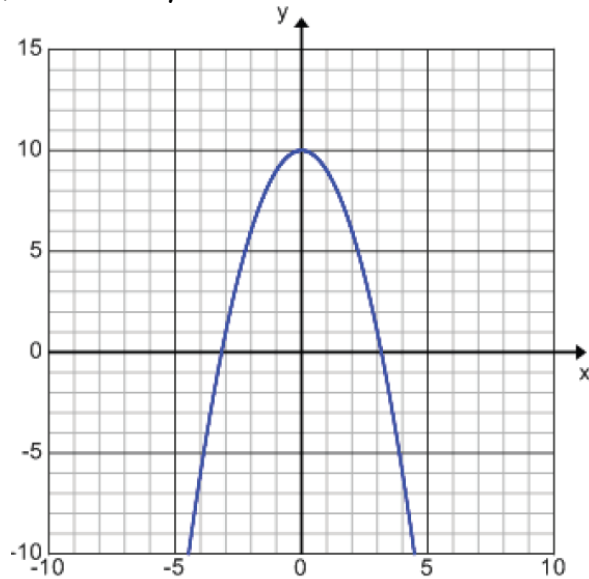

a. $[1, 2], [3, 5], [6, 7], [8, 9]$ c. $[2, 3], [6, 7], [9, 10]$

b. $[2, 3], [5, 6], [7, 8], [9, 10]$ d. $[1, 1], [2, 2], [7, 7], [8, 8]$

31) What is the definition for the zero of a polynomial function?
   a. The zeros occur at (0, 0).
   b. The zeros occur where x equals zero.
   c. The zeros occur at y-values that make the function equal to zero.
   d. The zeros occur at x-values that make the function equal to zero.
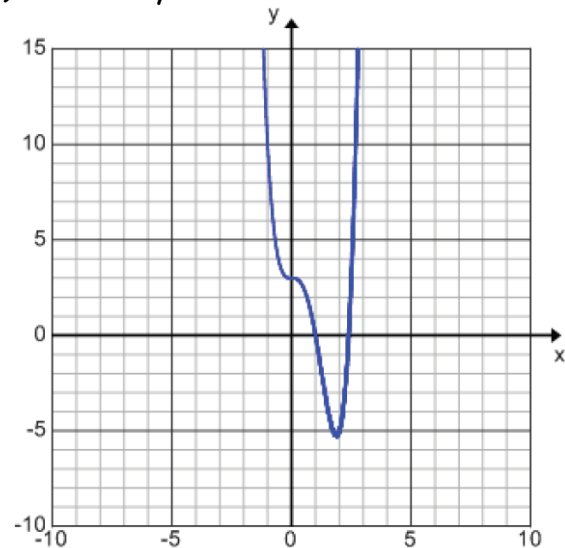
32) How many zeros are shown in the following graph?

   a. –1   c. 1
   b. 0   d. 2

33) How many zeros are shown in the following graph?

   a. 0   c. 2
   b. 1   d. infinity

34) What are the zeros for the function graphed below?

a. about (0, –1)
b. about (–1, 2) and (2, –1)

c. about (1.5, 4)
d. about (–1, 0) and (2, 0)

35) How can you shift the following graph to create zeros?

a. shift the polynomial 4 units down
b. shift the polynomial 4 units up

c. shift the polynomial 4 units left
d. shift the polynomial 4 units right

Use the following real-world situation and graph to answer problems 36-40.
Tonya sells crafts at craft fairs. It costs her money to make the crafts and have a booth at each craft fair. Sometimes she sells crafts and makes a profit. Other times she sells crafts, but not enough to make a profit, in which case she has a loss. Sometimes she breaks even. The graph below shows net profit/loss for 10 craft shows last year.
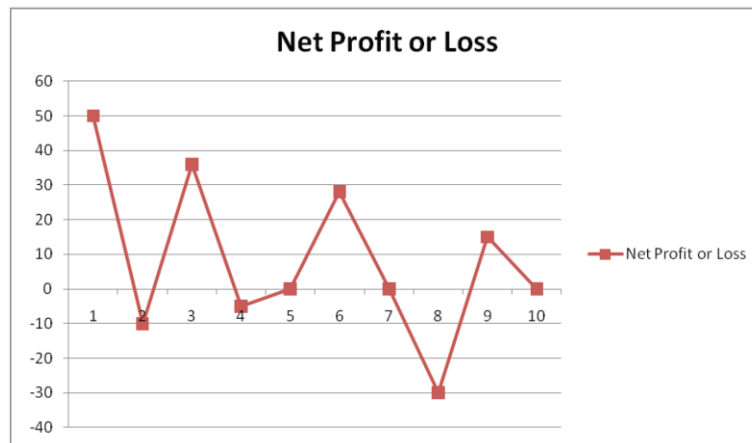

36) What do the zeros represent in this real-world situation?

a. net profit   c. break even

b. net loss   d. pure profit

37) How many zeros are in the graph?

a. –3   c. 6

b. 3   d. 10

38) What is a feasible range for this function?

a. $0 to $100   c. –$1000 to $1000

b. –$100 to –$50   d. –$50 to $100

39) Between what two craft shows did the amount Tonya made decrease the most?

a. show 1 and show 2   c. show 6 and show 7

b. show 2 and show 3   d. show 7 and show 8

40) At which craft shows did Tonya make a profit?

a. shows 1, 2, 3, 4, and 7   c. shows 1, 3, 6, and 9

b. shows 2, 4, 5, 7, 8, and 10 d. shows 5, 7, and 10

41) In the 3-D coordinate system, which number represents z in the ordered triple: (1, 5, –2)?

a. 1   c. –2

b. 5   d. 4

42) What is the ordered triple for the plot below?
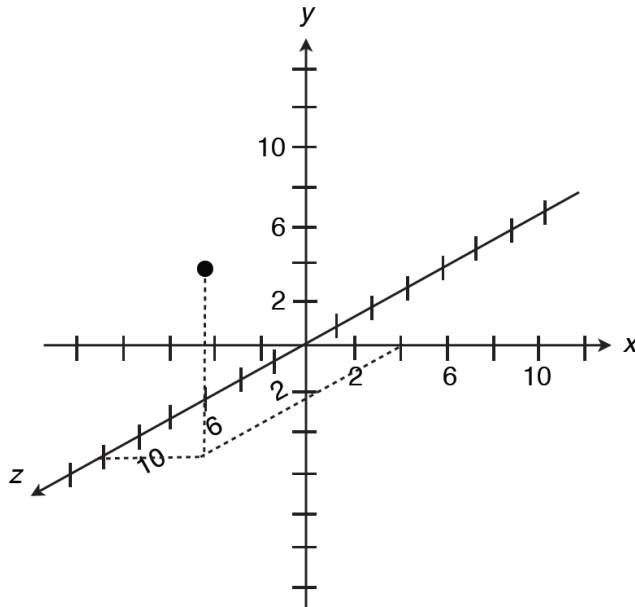
a. (9, 4, 12)   c. (12, 9, 4)
b. (4, 12, 9)   d. (4, 9, 12)

43) What is the distance between (1, 5) and (–2, –8) in the 2-D coordinate system?

     a. 3 units   c. 113.78 units
     b. 13.34 units   d. 178 units

44) The distance between two points in 2-D space can be found using which formula?

a. $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

b. $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$

c. $d = (x_2 - x_1)^2 + (y_2 - y_1)^2$

d. $d = (x_2 - x_1)^2 + (y_2 - y_1)^2 + (x_2 - x_1)^2 + (y_2 - y_1)^2$

45) What is the distance between (1, 4, 3) and (–2, 4, 7) in the 3-D coordinate system?

     a. 1.21 units   c. 19 units
     b. 5 units   d. 25 units

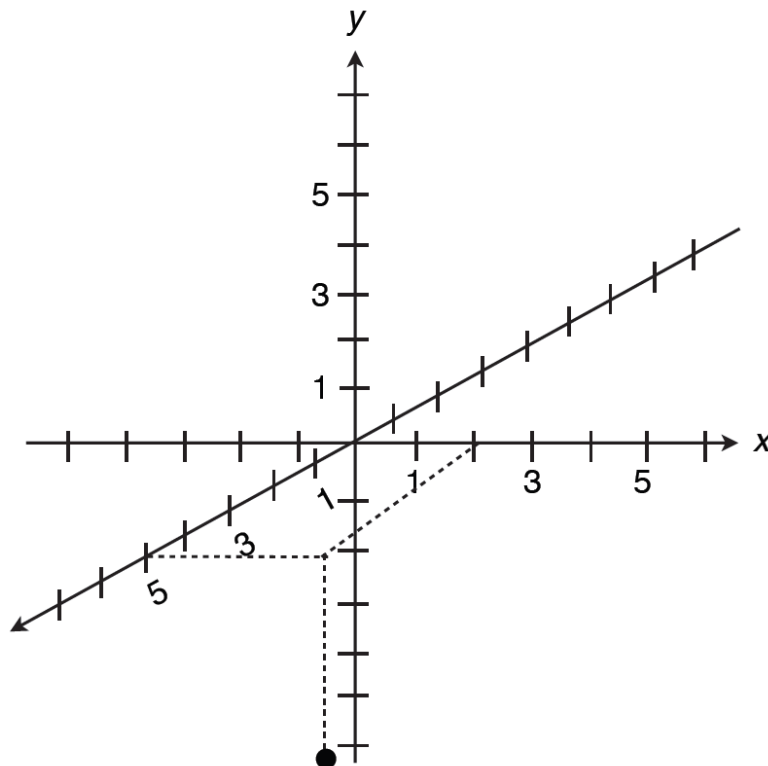46) In the 3-D coordinate system, which number represents x in the ordered triple
(4, –10, 7)?

     a. 4   c. 10
     b. –10   d. 7

47) What is the ordered triple for the plot below?

a. (4, 2, 5)   c. (-4, 2, 5)
b. (2, -4, 5)   d. (5, 4, 2)

48) The distance between two points in 3-D space can be found using which formula?

a. $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

b. $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$

c. $d = (x_2 - x_1)^2 + (y_2 - y_1)^2$

d. $d = (x_2 - x_1)^2 + (y_2 - y_1)^2 + (x_2 - x_1)^2 + (y_2 - y_1)^2$

49) What is the distance between (2, 5, 1) and (8, 8, 10) in the 3-D coordinate system?

a. 2 units   c. 121 units
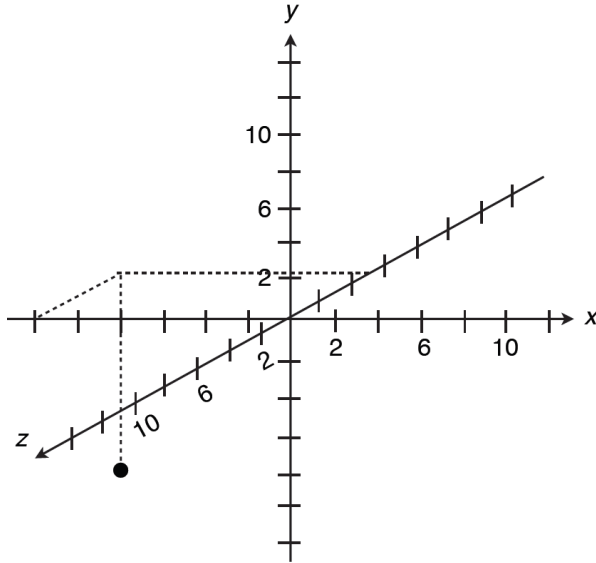b. 11.22 units   d. 221.22 units

50) What is the distance between (-2, -10, -9) and (-4, -8, -7) in the 3-D coordinate system?

a. -2.34 units   c. 3.46 units
b. 1.22 units   d. 16 units

51) Which theorem do you use in the distance formula?

a. Kepler   c. Ohm
b. Pythagorean   d. Square

52) What is the ordered triple for the plot below?

a. (−12, −10, −5)   c. (−12, −10, −5)
b. (0, −12, 0)   d. (−10, −12, −5)

53) How many "pieces" are there in the three-dimensional coordinate system?
    a. 1   c. 6
    b. 4   d. 8

54) A rectangular box has width = 2 inches, length = 5 inches, and height = 8 inches. What is the distance of the diagonal between the lower-left corner of the box and the upper-right corner on the other side of the box?
    a. 7 inches   c. 18.2 inches
    b. 9.64 inches   d. 93 inches

55) What is the distance between the points (100, 200, 50) and (−77, 14, 91) in the 3-D coordinate system?
    a. 54.7 units   c. 260.01 units
    b. 131.6 units   d. 306.22 units

56) Tonya's goal is to make a net profit at each craft show. Would Tonya want zeros to appear on the graph of her net profits? Would Tonya want negative numbers on the graph of her net profits? Explain your answers.

57) How do you use the Pythagorean Theorem to find the distance between two points in the 3-D coordinate system?

1) What is the domain of the relation (0, 2), (1, 4), (3, 3), (–4, 5)?
   a. a. {4}   c. {–4, 0, 1, 3}
   b. b. {–4, 0, 1, 2, 3, 5}   d. {2, 3, 4, 5}

2) Which relation represents a function?
   a. a. (1, 3), (3, 5), (1, 4), (–1, 6)   c. (4, 4), (5, 5), (4, –10)
   b. b. (5, 1), (–4, 1), (5, 2)   d. (–5, 8), (4, 12), (8, 12), (–10, 9)

3) What type of polynomial function is   –   ?
   a. a. cubic   c. quadratic
   b. b. quartic   d. quintic

4) The graph of a quadratic equation is what shape?
   a. a. parabola   c. slope
   b. b. line   d. circle

5) What is the degree of the polynomial expression   –   ?
   a. a. 1   c. 5
   b. b. 3   d. 9

6) What is the range of the relation (0, 2), (1, 4), (3, 3), (–4, 5)?
   a. a. {4}   c. {–4, 0, 1, 3}
   b. b. {–4, 0, 1, 2, 3, 5}   d. {2, 3, 4, 5}

7) Which relation represents a function?
   a. (2, 3), (3, 5), (1, 4), (2, 6)   c. (4, 4), (4, 5), (4, –10)
   b. (5, 3), (–4, 1), (–5, 2)   d. (–5, 8), (4, 12), (4, 12), (–10, 9)

8) What type of polynomial function is   –   – ?
   a. quadratic   c. quintic
   b. quartic   d. cubic

9) What type of polynomial expression is   ?
   a. monomial   c. trinomial
   b. binomial   d. octonomial

10) What is the degree of the polynomial expression –   –   ?
   a. 4   c. 7
   b. 6   d. 10

11) The graph of a linear function has what shape?

       a. parabola   c. wave

       b. hyperbola   d. line

12) What is the leading coefficient for   –   ?

       a. –2   c. 5

       b. 1   d. 21

13) A quintic function has what degree?

       a. 2   c. 4

       b. 3   d. 5

14) A quadratic function has what degree?

       a. 2   c. 4

       b. 3   d. 5

15) Which expression is a quartic function?

       a.   –   c.   –   –

       b.   –   d.

16) Is   odd, even, both, or neither?

       a. odd   c. both

       b. even   d. neither

17) An even function has what type of symmetry?

       a. symmetric through the origin   c. symmetric about the y-axis

       b. symmetric about the x-axis   d. no symmetry

18) What is the degree of the polynomial for   ?

       a. 2   c. 5

       b. 4   d. 7

19) What is the absolute maximum for the following graph?

    a. (1.5, 2)   c. (-2, -2)

    b. (0, 0)   d. no absolute maximum

20) How many turning points are in the graph below?

    a. 1   c. 4

    b. 2   d. infinity

21) Is   odd, even, both, or neither?

    a. odd   c. both

    b. even   d. neither

22) An odd function has what type of symmetry?

    a. symmetric through the origin   c. symmetric about the y-axis

    b. symmetric about the x-axis   d. no symmetry

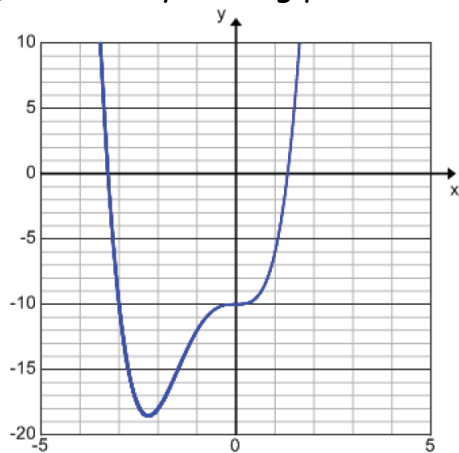23) What are the zeros for   –   ?

    a. (0, 2)   c. (-2.58, 0), (1.43, 0)

    b. (-1.43, 0)   d. (0, 0), (2.58, -1.43)

24) What is the relative minimum for the following graph?

a. (1.5, 2)   c. (–1.5, –2)
b. (0, 0)   d. no relative minimum

25) How many turning points are in the graph below?
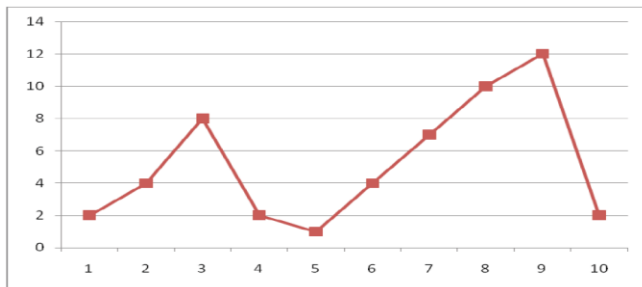

a. 1   c. 4
b. 2   d. infinity

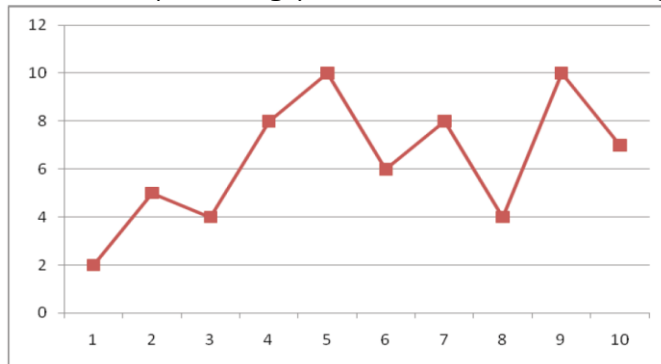26) What is the end behavior for the function   ?
   a. The left side has an absolute maximum.
   b. The right side has an absolute minimum.
   c. The left side and right side have relative minima
   d. The left side extends into positive infinity and the right side extends into positive infinity.

27) What is the range for the graph below?

a. $1 \le x \le 12$ c. $1 \le y \le 10$
b. $1 \le y \le 12$ d. $1 \le x \le 10$

28) How many turning points are shown on the graph below?
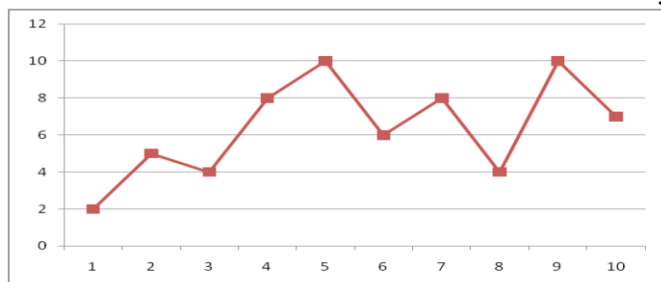

a. 4   c. 8
b. 7   d. 10

29) Which function only has an absolute maximum?
     a.   c.   –
     b.   d.   –

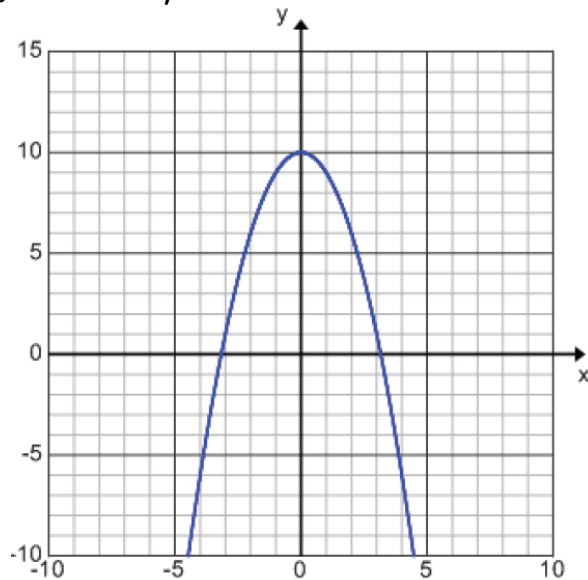30) What are the intervals of increase for the graph below?

a. $[1, 2], [3, 5], [6, 7], [8, 9]$ c. $[2, 3], [6, 7], [9, 10]$
b. $[2, 3], [5, 6], [7, 8], [9, 10]$ d. $[1, 1], [2, 2], [7, 7], [8, 8]$

31) What is the definition for the zero of a polynomial function?
   a. The zeros occur at (0, 0).
   b. The zeros occur where x equals zero.
   c. The zeros occur at y-values that make the function equal to zero.
   d. The zeros occur at x-values that make the function equal to zero.

32) How many zeros are shown in the following graph?

   a. –1   c. 1
   b. 0   d. 2

33) How many zeros are shown in the following graph?

   a. 0   c. 2
   b. 1   d. infinity

34) What are the zeros for the function graphed below?

a. about (0, –1)   c. about (1.5, 4)
b. about (–1, 2) and (2, –1)   d. about (–1, 0) and (2, 0)

35) How can you shift the following graph to create zeros?

a. shift the polynomial 4 units down   c. shift the polynomial 4 units left
b. shift the polynomial 4 units up   d. shift the polynomial 4 units right

36) Use the following real-world situation and graph to answer problems 6–11.

Tonya sells crafts at craft fairs. It costs her money to make the crafts and have a booth at each craft fair. Sometimes she sells crafts and makes a profit. Other times she sells crafts, but not enough to make a profit, in which case she has a loss. Sometimes she breaks even. The graph below shows net profit/loss for 10 craft shows last year.

37) What do the zeros represent in this real-world situation?

a. net profit   c. break even

b. net loss   d. pure profit

38) How many zeros are in the graph?

a. –3   c. 6

b. 3   d. 10

39) What is a feasible range for this function?

a. $0 to $100   c. –$1000 to $1000

b. –$100 to –$50   d. –$50 to $100

40) Between what two craft shows did the amount Tonya made decrease the most?

a. show 1 and show 2   c. show 6 and show 7
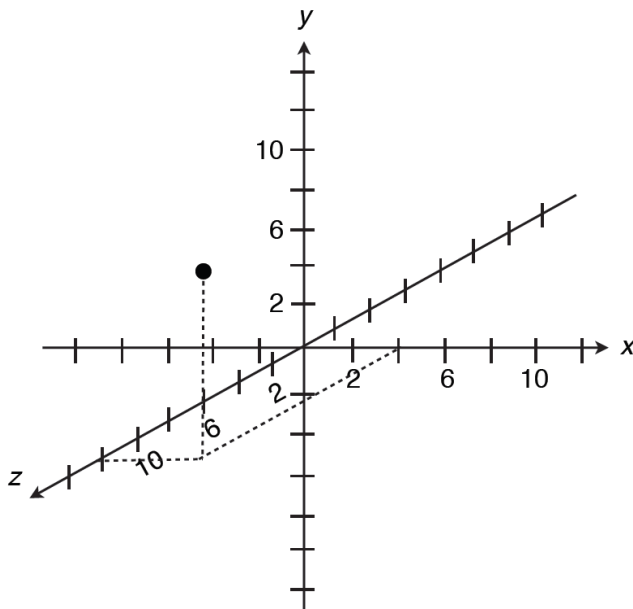
b. show 2 and show 3   d. show 7 and show 8

41) At which craft shows did Tonya make a profit?

a. shows 1, 2, 3, 4, and 7   c. shows 1, 3, 6, and 9

b. shows 2, 4, 5, 7, 8, and 10   d. shows 5, 7, and 10

42) In the 3-D coordinate system, which number represents z in the ordered triple: (1, 5, –2)?

a. 1   c. –2

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43) What is the ordered triple for the plot below?

    a. (9, 4, 12)   c. (12, 9, 4)

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44) What is the distance between (1, 5) and (–2, –8) in the 2-D coordinate system?

    a. a. 3 units   c. 113.78 units

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45) The distance between two points in 2-D space can be found using which formula?

    a. a.

    b.

    c.

    d.

46) What is the distance between (1, 4, 3) and (–2, 4, 7) in the 3-D coordinate system?

    a. a. 1.21 units   c. 19 units

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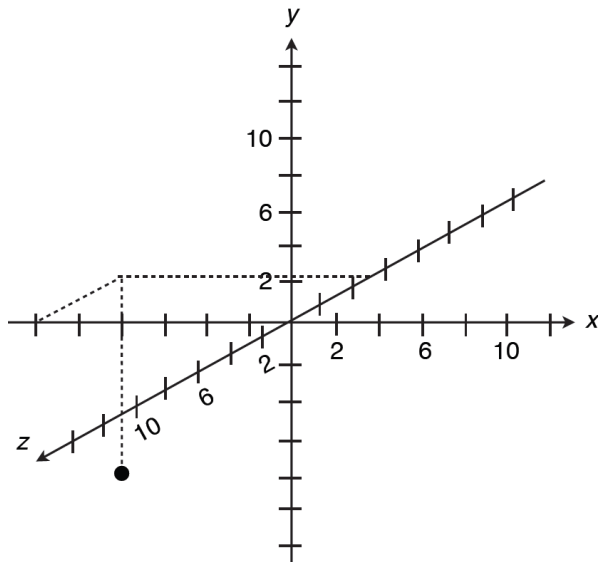
    a. (–12, –10, –5)   c. (–12, –10, –5)
    b. (0, –12, 0)   d. (–10, –12, –5)

54) How many "pieces" are there in the three-dimensional coordinate system?
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