

## Review for Semester Exam

**Solve each equation by taking square roots.**

1)  $16m^2 - 5 = -1$

A)  $\left(\frac{1}{4}, -\frac{1}{4}\right)$

B)  $\left(\frac{i\sqrt{6}}{4}\right)$

C)  $\left(\frac{1}{2}, -\frac{1}{2}\right)$

D)  $\left(\frac{1}{2}\right)$

2)  $25k^2 - 4 = 12$

A)  $\left(\frac{i\sqrt{255}}{5}, -\frac{i\sqrt{255}}{5}\right)$

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

C)  $\{0\}$

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

**Select the best choice.**

- 3) One hundred people are recruited for an experimental study to determine whether exercising 30 minutes before lunch or 30 minutes after lunch will help improve heart health more. They will be split into two groups that do not necessarily need to be the same size. One group will exercise and then eat, and the other group will do the same exercises after eating instead. After a month, each person's heart health improvement will be assessed by the same doctor, and the groups will be compared. This describes which of the following:

- A) A observational study  
 B) An experimental study  
 C) A survey  
 D) A random process

**Find each product.**

4)  $(2x - 4)(5x^2 - 2x - 2)$

A)  $-4x^3 - x^2 + 9x + 5$

B)  $-12x^3 + 4x^2 + 2x - 4$

C)  $-5x^3 + 5x^2 + 7x + 6$

D)  $10x^3 - 24x^2 + 4x + 8$

**Select all intersection of the following functions.**

- 5) Consider the functions P and Q, defined as shown.

$$P(x) = x^2 + 7x - 14$$

$$Q(x) = -0.5x + 10$$

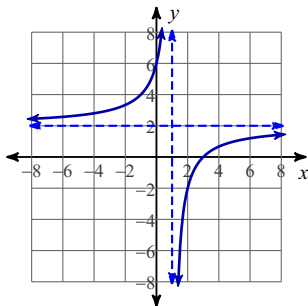
What is/are the intersections of the graphs.

- A) (2.5, 15)      B) (-9.9, 8.8)  
 C) (2.5, 8.8)      D) (-9.9, 15)

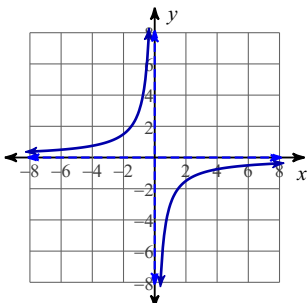
Graph each function.

6)  $f(x) = -\frac{4}{x-1} + 2$

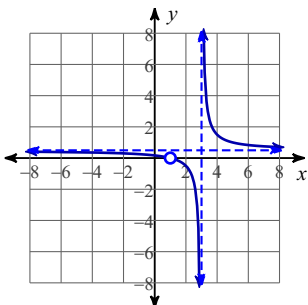
A)



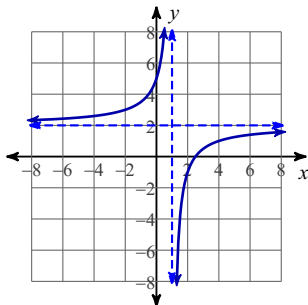
B)



C)



D)



Factor. One factor has been given.

8)  $x^4 + 7x^3 + 2x^2 - 40x = 0$ ;  $x - 2$

A)  $2x(x+4)(x+6)(x-2) = 0$

B)  $x(x+4)(x+5)(x-2) = 0$

C)  $x(x+4)(x+6)(x-2) = 0$

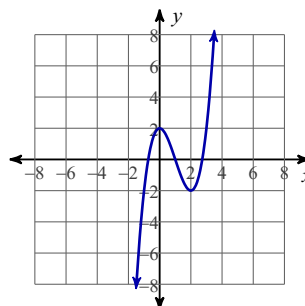
D)  $2x(x+4)(3x+5)(x-1) = 0$

Sketch the graph of each function.

Approximate each real zero to the nearest tenth.

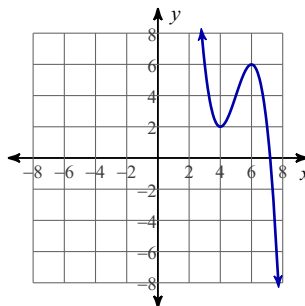
7)  $f(x) = -x^3 + 2x^2 + 2$

A)



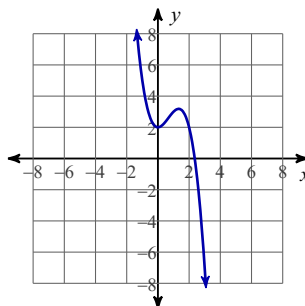
Real Zeros:  $-0.7, 1, 2.7$

B)



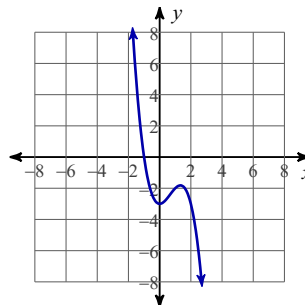
Real Zeros:  $7.2$

C)



Real Zeros:  $2.4$

D)



Real Zeros:  $-1$

Factor each. One root has been given.

9)  $x^4 - 6x^3 + 30x - 25 = 0$ ;  $5$

A)  $(x-1)(x^2-5)(2x+7) = 0$

B)  $(x-1)(x^2-5)(x+3) = 0$

C)  $x(x^2-5)(x-5) = 0$

D)  $(x-1)(x^2-5)(x-5) = 0$

**Solve the equation.**

$$10) \frac{x+4}{x^2} - \frac{x-3}{x^2} = \frac{2}{x}$$

- A)  $\{1\}$       B)  $\left\{\frac{7}{2}\right\}$   
C)  $\{-3\}$       D)  $\{3\}$

**Solve each equation with the quadratic formula.**

$$11) 2k^2 - 2 = 0$$

- A)  $\{1, -1\}$   
B)  $\left\{\frac{-3+i\sqrt{3}}{6}, \frac{-3-i\sqrt{3}}{6}\right\}$   
C)  $\left\{\frac{1}{2}, -\frac{1}{2}\right\}$   
D)  $\{i, -i\}$

**Describe the end behavior of each function.**

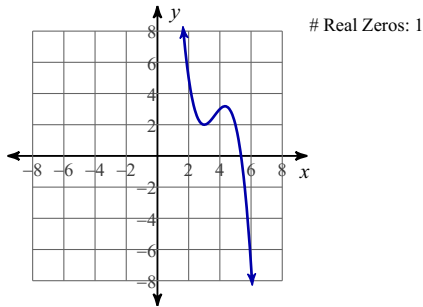
$$12) f(x) = -x^2 - 8x - 17$$

- A)  $f(x) \rightarrow -\infty$  as  $x \rightarrow -\infty$   
 $f(x) \rightarrow -\infty$  as  $x \rightarrow +\infty$   
B)  $f(x) \rightarrow +\infty$  as  $x \rightarrow -\infty$   
 $f(x) \rightarrow +\infty$  as  $x \rightarrow +\infty$   
C)  $f(x) \rightarrow -\infty$  as  $x \rightarrow -\infty$   
 $f(x) \rightarrow +\infty$  as  $x \rightarrow +\infty$   
D)  $f(x) \rightarrow +\infty$  as  $x \rightarrow -\infty$   
 $f(x) \rightarrow -\infty$  as  $x \rightarrow +\infty$

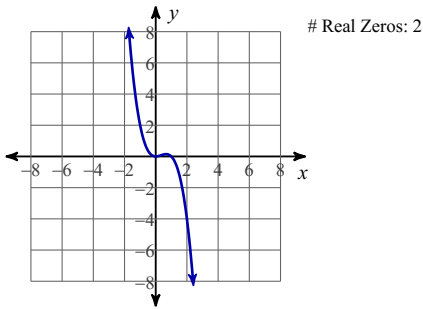
Sketch the graph of each function. State the number of real zeros.

13)  $f(x) = x^3 + 11x^2 + 35x + 27$

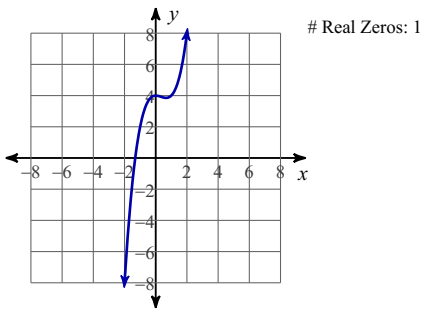
A)



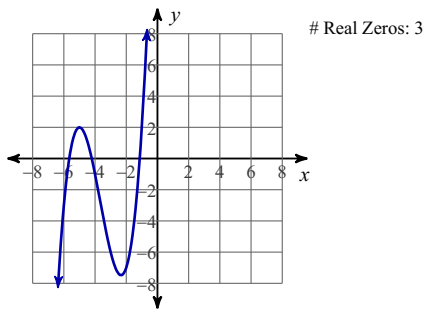
B)



C)



D)



Name each polynomial by degree .

14)  $-6 - 6x^2$

A) constant

B) cubic

C) quadratic

D) linear

Name the number of terms in the polynomial.

15)  $-8m^5 + 5m^2$

- A) one            B) three  
C) four           D) two

What is the constant term of the polynomial.

16)  $n - 6$

- A) -6            B) 1  
C) 6             D) -1

Solve each equation by factoring.

17)  $x^2 - 8x + 7 = 0$

- A)  $\{-5, -7\}$         B)  $\{7, 1\}$   
C)  $\{4, 1\}$             D)  $\{4, -1\}$

Solve each equation. Remember to check for extraneous solutions.

18)  $\sqrt{15 - x} = \sqrt{2x - 6}$

- A)  $\{7\}$             B)  $\{8, 3\}$   
C)  $\{7, 8\}$         D)  $\{8\}$

19)  $-3 = -3\sqrt{x + 1}$

- A)  $\{-3, 0\}$         B)  $\{0\}$   
C)  $\{-1\}$             D)  $\{-3, -2\}$

20)  $\frac{v + 6}{2v} = \frac{1}{v} + \frac{5}{2}$

- A)  $\{1\}$             B)  $\left\{\frac{4}{5}\right\}$   
C)  $\left\{-\frac{7}{2}\right\}$         D)  $\{-5\}$

Describe the end behavior of the function.

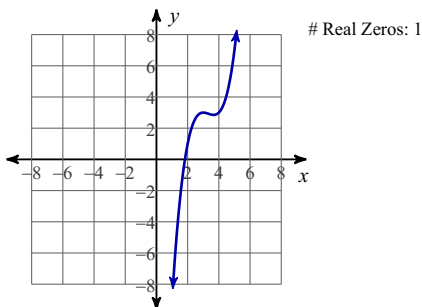
21)  $f(x) = x^3 - 4x^2 + 3$

- A)  $f(x) \rightarrow -\infty$  as  $x \rightarrow -\infty$   
 $f(x) \rightarrow +\infty$  as  $x \rightarrow +\infty$   
B)  $f(x) \rightarrow +\infty$  as  $x \rightarrow -\infty$   
 $f(x) \rightarrow -\infty$  as  $x \rightarrow +\infty$   
C)  $f(x) \rightarrow -\infty$  as  $x \rightarrow -\infty$   
 $f(x) \rightarrow -\infty$  as  $x \rightarrow +\infty$   
D)  $f(x) \rightarrow +\infty$  as  $x \rightarrow -\infty$   
 $f(x) \rightarrow +\infty$  as  $x \rightarrow +\infty$

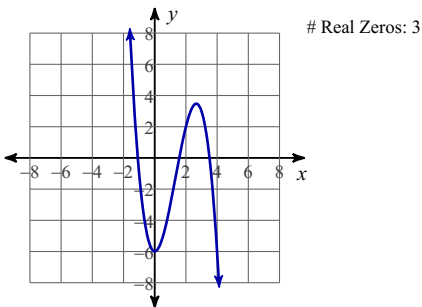
Sketch the graph of the function. State the number of real zeros.

22)  $f(x) = -x^3 + 4x^2 - 6$

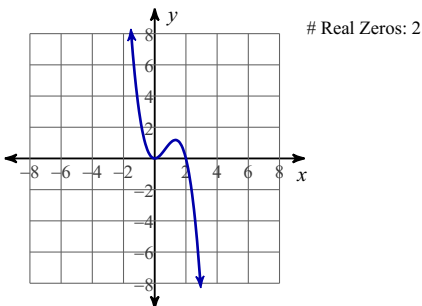
A)



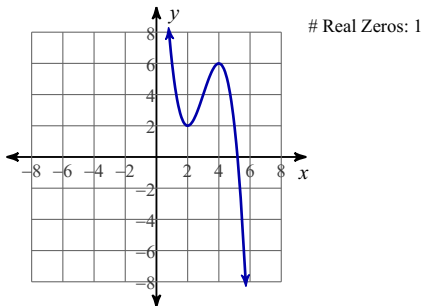
B)



C)



D)



Solve each equation. Remember to check for extraneous solutions.

23)  $\sqrt{p} = 1$

- A)  $\{2\}$       B)  $\{1\}$   
 C)  $\{4, -4\}$       D)  $\{4, 1\}$

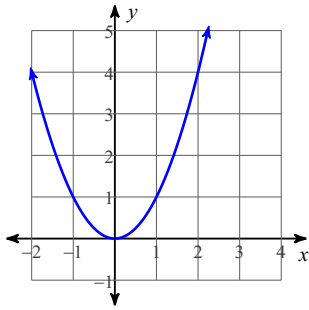
24)  $\sqrt{b+2} = 4$

- A)  $\{-1\}$       B)  $\{1\}$   
 C)  $\{14\}$       D)  $\{-5\}$

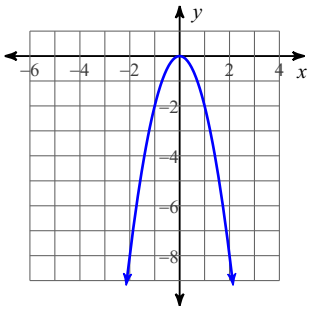
Sketch the graph of the function.

25)  $f(x) = 2x^2$

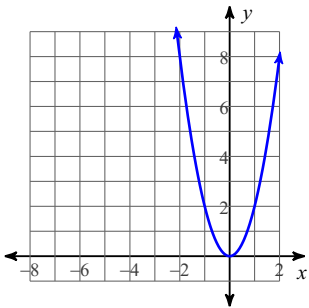
A)



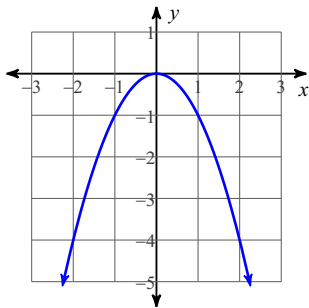
B)



C)

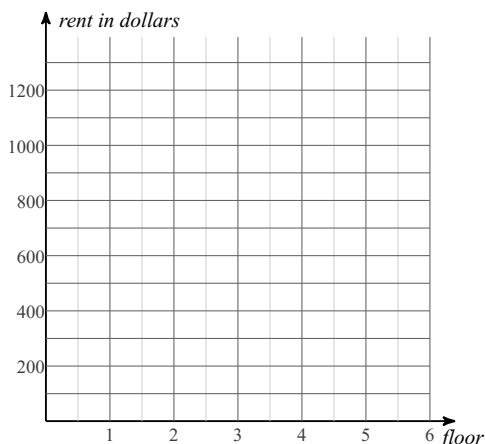


D)



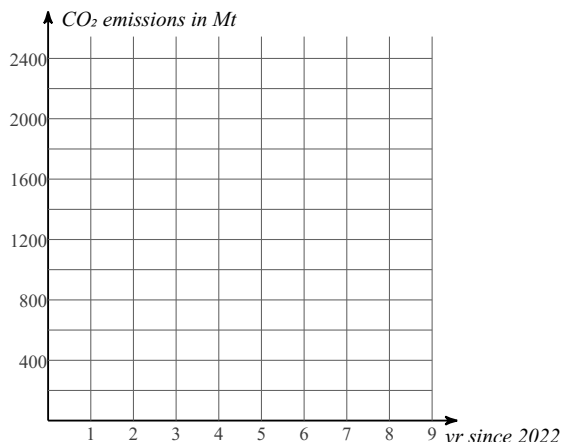
Solve each discrete exponential growth/decay problem. You may use the provided graph to plot points or sketch the exponential function.

- 26) Rentals in a high rise apartment building get more expensive higher up, since the views get better. The ground floor (floor 0) rent is \$1,050.00. The rent increases 2% per floor. What is the rent on the 5th floor?



- A)  $1050 \cdot 1.01^5 \approx \$1,103.56$   
 B)  $1050 \cdot 1.06^5 \approx \$1,405.14$   
 C)  $262.5 \cdot 1.01^5 \approx \$275.89$   
 D)  $1050 \cdot 1.02^5 \approx \$1,159.28$

- 27) A country pledges to reduce its annual CO<sub>2</sub> emissions by 3% per year. If the emissions in 2022 are 2,120 Mt (metric megatons), what are the maximum allowable emissions in the year 2029?



- A)  $2120 \cdot 0.91^7 \approx 1,096$  Mt  
 B)  $2120 \cdot 0.98^7 \approx 1,840$  Mt  
 C)  $2120 \cdot 0.97^7 \approx 1,713$  Mt  
 D)  $2120 \cdot 0.99^7 \approx 1,976$  Mt

- 28) Select the property that is NOT true of a normal distribution.

- A) The area under the normal distribution curve and within 2 standard deviations of the center is about 95% of the total area under the curve.  
 B) The distribution is determined by the mean and standard deviation.  
 C) The distribution has a height of zero when it is more than 3 standard deviations away from the center.  
 D) The distribution is bell-shaped.

- 29) A student measures the wingspans of 40 local dragonfly specimens selected at random. The sample mean is 6.8 centimeters with a margin of error of 0.9 centimeters. Based on this information, what are plausible values for the mean wingspans of the population of local dragonflies?

- A) between 39.1 and 40.9 centimeters  
 B) between 33.2 to 46.9 centimeters  
 C) between -0.1 and 1.8 centimeters  
 D) between 5.9 and 7.7 centimeters



Write a polynomial function of least degree with integral coefficients that has the given zeros.

30) 4, 2, -2

- A)  $f(x) = x^3 - 4x^2 - 4x + 24$
- B)  $f(x) = x^3 - 4x^2 - 4x + 15$
- C)  $f(x) = x^3 - 4x^2 - 4x + 16$
- D)  $f(x) = x^3 - 8x^2 - 4x + 16$

31)  $-3, -\frac{3}{4}, -1$

- A)  $f(x) = 4x^3 + 19x^2 + 24x + 16$
- B)  $f(x) = 4x^3 + 17x^2 + 24x + 9$
- C)  $f(x) = 4x^3 + 19x^2 + 24x + 9$
- D)  $f(x) = 4x^3 + 19x^2 + 29x + 9$

Factor each.

32)  $x^2 + x - 6 = 0$

- A)  $(x - 2)(x + 1) = 0$
- B)  $x(x + 3) = 0$
- C)  $(x - 2)(x + 3) = 0$
- D)  $(3x - 2)(x + 3) = 0$

33)  $x^4 - 8x = 0$

- A)  $x(x - 2)(x^2 + 2x + 3) = 0$
- B)  $2x(x - 2)(x^2 + 2x + 2) = 0$
- C)  $x(x - 2)(x^2 + 2x + 4) = 0$
- D)  $x(x - 2)(x^2 + 4) = 0$

34)  $x^3 - 10x^2 + 25x = 0$

- A)  $x(x - 5)^2 = 0$
- B)  $x(3x - 5)^2 = 0$
- C)  $x(x + 3)^2 = 0$
- D)  $x(x + 4)^2 = 0$

35)  $x^4 - 12x^2 + 35 = 0$

- A)  $(x^2 - 7)(x^2 - 5) = 0$
- B)  $(x^2 + 6)(x^2 - 5) = 0$
- C)  $(3x^2 - 7)(x^2 - 5) = 0$
- D)  $(2x^2 - 7)(x^2 - 5) = 0$

36)  $x^3 + 125 = 0$

- A)  $(x + 3)(x^2 - 5x + 25) = 0$
- B)  $(x + 3)(x^2 + 6x + 25) = 0$
- C)  $(x + 5)(x^2 + 5x + 25) = 0$
- D)  $(x + 5)(x^2 - 5x + 25) = 0$

37)  $x^4 - 4x^3 + 5x^2 - 20x = 0$

- A)  $x(3x - 4)(x^2 + 5) = 0$
- B)  $x(x + 3)(x^2 + 5) = 0$
- C)  $x(x - 4)(x^2 + 5) = 0$
- D)  $x(x - 4)(x^2 + 4) = 0$

Simplify each expression.

38)  $(8p^3 - 5 - 2p) - (4 + 5p^3)$

- A)  $3p^3 - 2p + 2$
- B)  $3p^3 - 2p - 9$
- C)  $3p^3 - 2p - 2$
- D)  $3p^3 - 2p + 6$

39)  $(3 - 2n^2) + (5n^3 + 5n - 4 - n^2)$

- A)  $4n^3 + 5n^2 + 5n - 1$
- B)  $4n^3 + 5n^2 + 2n - 1$
- C)  $4n^3 - 3n^2 + 5n - 1$
- D)  $5n^3 - 3n^2 + 5n - 1$

Find each product.

40)  $(7x + 7)(x - 6)$

- A)  $7x^2 - 49x + 42$
- B)  $7x^2 - 42$
- C)  $15x^2 + 19x - 8$
- D)  $7x^2 - 35x - 42$

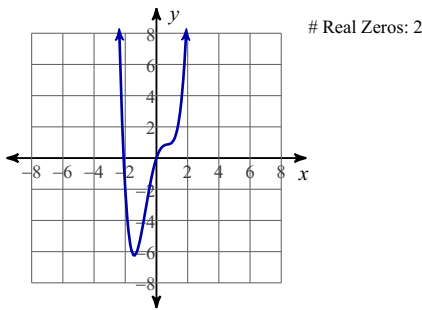
41)  $7(8x^2 + 2x - 8)$

- A)  $56x^2 + 14x - 56$
- B)  $28x^2 - 21x - 56$
- C)  $42x^2 - 30x - 48$
- D)  $12x^3 + 24x^2 + 9x$

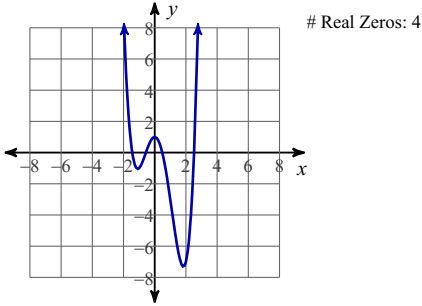
Sketch the graph of each function. State the number of real zeros.

42)  $f(x) = x^4 - x^2 + x + 4$

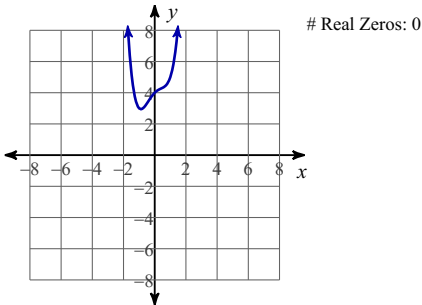
A)



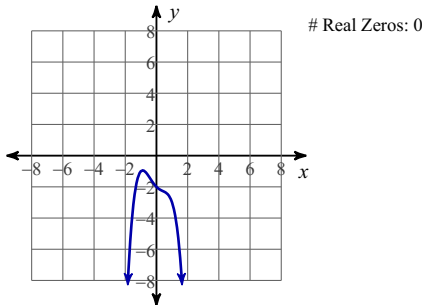
B)



C)



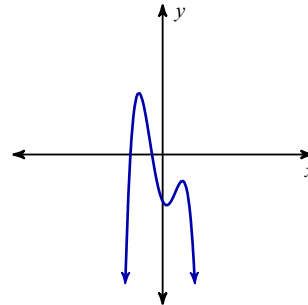
D)



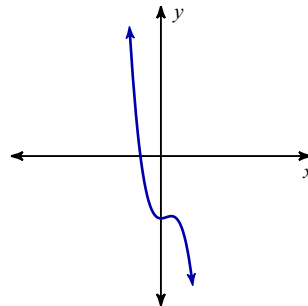
Sketch the general shape of each function.

43)  $f(x) = -x^4 + 4x^2 - 2x - 3$

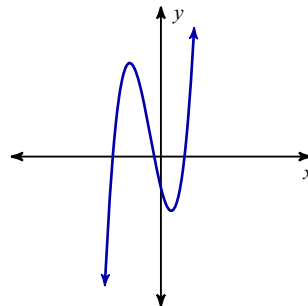
A)



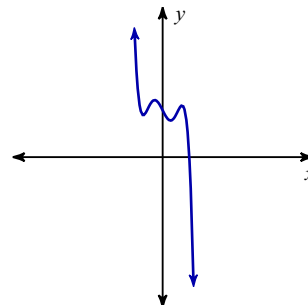
B)



C)



D)



**Describe the end behavior of each function.**

44)  $f(x) = x^3 - 8x^2 + 20x - 15$

- A)  $f(x) \rightarrow +\infty$  as  $x \rightarrow -\infty$   
 $f(x) \rightarrow -\infty$  as  $x \rightarrow +\infty$
- B)  $f(x) \rightarrow -\infty$  as  $x \rightarrow -\infty$   
 $f(x) \rightarrow -\infty$  as  $x \rightarrow +\infty$
- C)  $f(x) \rightarrow +\infty$  as  $x \rightarrow -\infty$   
 $f(x) \rightarrow +\infty$  as  $x \rightarrow +\infty$
- D)  $f(x) \rightarrow -\infty$  as  $x \rightarrow -\infty$   
 $f(x) \rightarrow +\infty$  as  $x \rightarrow +\infty$

**Simplify each expression.**

45)  $\frac{x-2}{8} \cdot \frac{6x+6}{6}$

- A)  $\frac{2}{3}$       B)  $\frac{x-5}{x+2}$
- C)  $\frac{x-2}{x+2}$       D)  $\frac{(x-2)(x+1)}{8}$

46)  $\frac{n+3}{n^2+n-6} \div \frac{1}{2n^2}$

- A)  $\frac{3n}{n+2}$       B)  $\frac{2n^2}{n-2}$
- C)  $\frac{3n}{n-3}$       D)  $\frac{3}{n-3}$

**Solve each equation.**

47)  $243 = a^{\frac{5}{4}}$

- A)  $\{81\}$       B)  $\{-81, 0\}$
- C)  $\{-81, 4\}$       D)  $\{-81\}$

48)  $-15 = -3(b-16)^{\frac{1}{2}}$

- A)  $\{-41, 10\}$       B)  $\{-5, 10\}$
- C)  $\{41\}$       D)  $\{1, 10\}$

**Solve each equation with the quadratic formula.**

49)  $2k^2 - 5k + 2 = 0$

- A)  $\{4.562, 0.438\}$
- B)  $\{2, 0.5\}$
- C)  $\{-0.438, -4.562\}$
- D)  $\{2.851, -0.351\}$

50)  $5x^2 = 10 - 3x$

- A)  $\{2, -5\}$       B)  $\{0.468, -1.068\}$
- C)  $\{5, -2\}$       D)  $\{1.146, -1.746\}$

**Write a polynomial function of least degree with integral coefficients that has the given zeros.**

51)  $-\frac{2}{3}$  mult. 3

- A)  $f(x) = 27x^3 + 54x^2 + 36x + 9$
- B)  $f(x) = 27x^3 + 54x^2 + 36x + 8$
- C)  $f(x) = 27x^3 + 54x^2 + 36x + 6$
- D)  $f(x) = 27x^3 + 51x^2 + 36x + 8$

**Factor each. One factor has been given.**

52)  $y = x^3 + x^2 - 4x - 24$ ;  $x - 3$

- A)  $y = 2(x^2 + 2x + 4)(x - 3)$
- B)  $y = (x^2 + 5x + 8)(x - 3)$
- C)  $y = 3(x^2 + 4x + 8)(x - 1)$
- D)  $y = (x^2 + 4x + 8)(x - 3)$

**Simplify. Your answer should contain only positive exponents.**

53)  $r^2 \cdot 2r^2$

- A)  $r^2$       B)  $2r^4$   
C)  $3r^2$       D) 9

54)  $(2x)^{-3}$

- A)  $x^6$       B)  $\frac{1}{x^2}$   
C)  $\frac{1}{8x^3}$       D) 1

55)  $\frac{3b^3}{-b^{-2}}$

- A)  $-3b^5$       B)  $3b^5$   
C)  $\frac{b^3}{3}$       D)  $-b^6$