Day	Date	**Assignment** (Due the next class meeting)
Monday Tuesday	10/31/22 (A) 11/1/22 (B)	**After test:** 5.0 Operations with polynomials
Wednesday Thursday	11/2/22 (A) 11/3/22 (B)	5.1 Factoring and solving completely
Friday Monday	11/4/22 (A) 11/7/22 (B)	5.2 Long and synthetic division
Wednesday Thursday	11/9/22 (A) 11/10/22 (B)	5.3 Remainder theorem / Fundamental theorem of algebra
Monday Tuesday	11/14/22 (A) 11/15/22 (B)	5.4 Key features of polynomials
Wednesday Thursday	11/16/22 (A) 11/17/22 (B)	5.5 Key features of polynomials day 2
Friday Monday	11/18/22 (A) 11/21/22 (B)	5.6 Writing polynomial functions, models, and systems
Tuesday Monday Tuesday Wednesday	11/22/22 (A) 11/28/22 (B) 11/29/22 (A) 11/30/22 (B)	Review & Thanksgiving Break!
Thursday Friday	12/1/22 (A) 12/2/22 (B)	**Unit 5 Test**

Need help? Try www.khanacademy.org or or the DRHS Honors Algebra 2 Youtube Channel

5.0 Practice Problems

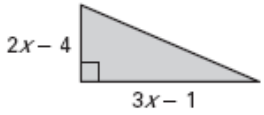
For #1 – 9, simplify each expression.

1. $(9b^2 + b - 2) + (-5b^2 - 2b + 8)$
2. $(11n^2 + 2n - 8) + (4n^2 - 5n + 7)$
3. $(w^3 + 4w^2 - 10w + 7) + (-6w^3 + 5w - 10)$
4. $(7y^2 - 7y + 6) - (3y^2 + 2y - 1)$
5. $4x^2 - (6x^3 + 5x^2 - 10x + 1) - 2(-2x^3 - 3x^2 + 3x) + 7$
6. $(t^4 - 3t + 18) - (-5t^4 + t^3 - 2t^2)$
7. $-5(h - 3)(h^2 + 2h - 8)$
8. $x(x - 7)(x + 7)$
9. $2(s + 9)^2(s - 4)$

For #10 – 11: Write the area of the figure as a polynomial.

10.

11.



For #12 – 15: Solve the absolute value equations.

12. $-14 = 4 - 9|\,-6 - b|$
13. $7|\,x - 3\,| - 4 = -25$
14. $-4|\,x + 2| + 2 = -6$
15. $2|\,x + 2\,| + 8 = 0$

16. Multiply: $(2i - 3)(2i + 3)$
17. Multiply: $(\sqrt{7} + 2x)(\sqrt{7} + 2x)$
18. Write the following quadratic in vertex form by completing the square: $y = 2x^2 - 8x + 11$.
19. Write a polynomial for the volume of a rectangular prism with a height of $(2x - 1)$, a width of $(x + 6)$, and a length of $(3x + 5)$.
20. For the function $f(x) = 2|x + 3| - 1$, what is the average rate of change on the interval $[-5, -1]$?
21. For the function $f(x) = -(x + 2)^2$, what is the average rate of change on the interval $[-5, -1]$?

5.1 Practice Problems

For #1 – 12: Factor each expression completely.

1) $64n^3 - 27$ 2) $27g^3 + 343$ 3) $2w^3 + 54$ 4) $x^3 + 6x^2 + 7x + 42$

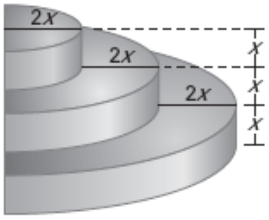
5) $c^3 + 4c^2 - 9c - 36$ 6) $z^4 - 5z^2 + 4$ 7) $x^4 - 36$ 8) $c^4 - 81$

9) $x^6 - 4$ 10) $24q^3 - 81$ 11) $a^6 + 7a^3 + 6$ 12) $2b^4 + 14b^3 - 16b - 112$

For # 13 – 15: Find the real-number solutions of the equation.

13) $n^4 + 6n^3 = 0$ 14) $x^3 - 25x = 50 - 2x^2$ 15) $6w^3 + 10w^2 - 18w - 60 = -20w^2 + 30$

16) Theater A stage crew is assembling a three-level semi-circular platform on a stage for a performance. The platform has the dimensions shown in the diagram and a total volume of 448π cubic feet. ($V = \pi r^2 h$)



a. What is the volume, in terms of x, of each of the three levels of the platform?
b. Use what you know about the total volume to write an equation involving x.
c. Solve the equation from part (b).
d. Use your solution from part (c) to calculate the dimensions (radius and height) of each of the levels of the platform.

For #17 – 19, factor each expression completely.

17) $5(x + 3) - 2(x + 3)^2$ 18) $x^3(x^2 - 1) + 8(x^2 - 1)$ 19) $2x(x + 3y)^3 - 5(x + 3y)^2$

20) Simplify: $\left(\frac{1}{4}c^3 - 3c^2 + \frac{5}{6}\right) - \left(\frac{1}{3}c^3 - 5c + \frac{2}{3}\right)$

21) The first five terms of a sequence are shown below.

1 3 5 7 9

What is the 11th term of the sequence?

A. 10 B. 11 C. 20 D. 21

5.2 Practice Problems

#1 – 6: Divide using polynomial long division.

1. $(x^2 + 5x - 14) \div (x - 2)$

2. $(x^2 - 2x - 48) \div (x + 5)$

3. $(x^3 + x + 30) \div (x + 3)$

4. $(6x^2 - 5x + 9) \div (2x - 1)$

5. $(8x^3 + 5x^2 - 12x + 10) \div (x^2 - 3)$

6. $(5x^4 + 2x^3 - 9x + 12) \div (x^2 - 3x + 4)$

#7 – 12: Divide using synthetic division.

7. $(x^2 + 7x + 12) \div (x + 4)$

8. $(x^3 - 3x^2 + 8x - 5) \div (x - 1)$

9. $(x^4 - 7x^2 + 9x - 10) \div (x - 2)$

10. $(2x^4 - x^3 + 4) \div (x + 1)$

11. $(2x^4 - 11x^3 + 15x^2 + 6x - 18) \div (x - 3)$

12. **12.** $(x^4 - 6x^3 - 40x + 33) \div (x - 7)$

For #13 – 14: Graph the piecewise functions.

13. $\begin{cases} -2, & if\ x < -2 \\ x^2 - 4, & if\ -2 \le x < 1 \\ -x + 6, & if\ x \ge 1 \end{cases}$

14. $\begin{cases} -2x - 3, & if\ x \le -3 \\ -4, & if\ -3 < x < 0 \\ -x^2 + 6, & if\ x \ge 0 \end{cases}$

For #15 – 17: Solve the equation.

15. $18x^2 + 48x = -32$

16. $9x^2 + 11x + 18 = -10x + 8$

17. **17.** $25x^2 - 24x - 9 = -7x^2 + 12x - 18$

18. The area of the triangle is 27 cm^2 and the height of the triangle is $3x$. Find the value of x if the base of the triangle is $4x + 1$

5.3 Practice Problems

For #1 – 14: A polynomial *f* and a factor of *f* are given. Factor *f* completely.

1) $f(x) = x^3 - 3x^2 - 16x - 12$; $x - 6$

2) $f(x) = x^3 - 12x^2 + 12x + 80$; $x - 10$

3) $f(x) = x^3 - x^2 - 21x + 45$; $x + 5$

4) $f(x) = 3x^3 - 16x^2 - 103x + 36$; $x + 4$

For # 5 – 9: A polynomial *f* and one zero of *f* are given. Find the other zeros of *f*

5) $f(x) = x^3 + 2x^2 - 20x + 24$; -6

6) $f(x) = x^3 + 11x^2 - 150x - 1512$; -14

7) $f(x) = 15x^3 - 119x^2 - 10x + 16$; 8

8) $f(x) = x^3 - 3x^2 - 45x + 175$; -7

9) $f(x) = x^3 - 9x^2 - 5x + 45$; 9

For # 10 – 15: Find all the zeros of the polynomial function.

10) $h(x) = x^3 - 3x^2 - x + 3$

11) $g(x) = x^4 - 9x^3 + 23x^2 - 81x + 126$

12) $f(x) = x^4 - 4x^3 - 20x^2 + 48x$

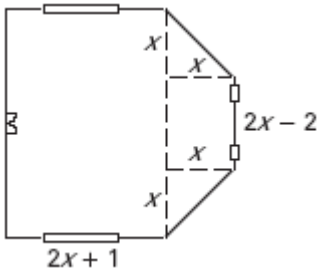
13) $f(x) = x^3 - x^2 - 11x + 3$

14) $g(x) = x^3 + 5x^2 + x + 5$

15) $h(x) = 2x^4 + x^3 + x^2 + x - 1$

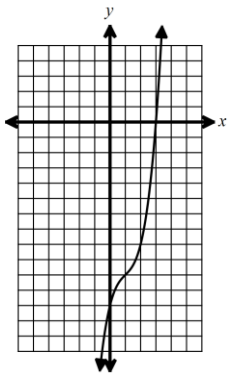
16) Simplify: $\left(\sqrt{2}d^2 - 6d + 1\right) + \left(2\sqrt{2}d^2 + d - 8\right)$

17) **Construction** Find a polynomial that represents the total number of square feet for the floor plan shown to the right.



18) Factor completely: $3 - 24y^3$

19) Multiple Choice: The equation $x^3 - 3x^2 + 4x - 12 = 0$ is graphed to the right. Use the graph to help solve the equation and find all the roots of the function.



A. $x = 3, -2, 2$

B. $x = -12, 1, 3$

C. $x = 3, -2i, 2i$

D. $x = 12, \frac{3-i\sqrt{7}}{2}, \frac{3+i\sqrt{7}}{2}$

5.4 Practice Problems

For #1-3, Describe the end behavior of the graph of the polynomial function by completing these statements: as $x \to -\infty$, $f(x) \to$ _?_ and $x \to +\infty$, $f(x) \to$ _?_.

1. $f(x) = -2x^6 + 5x^4 - 2x + 11$

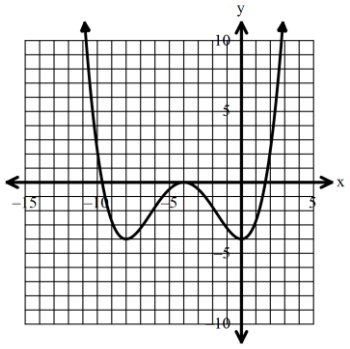
2. $y = (-7x^3 - x^2)(6x^4 + x^3 + 5)$

3. $g(x) = x^2(x - 4)$

5.4 Continued on next page….

For #4-5, Describe the intervals where the function is increasing and decreasing.

4.



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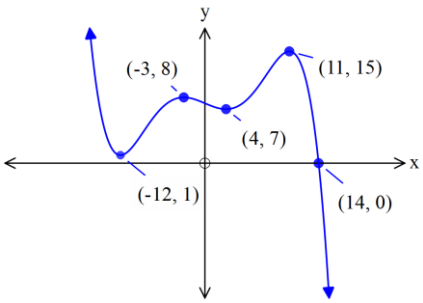
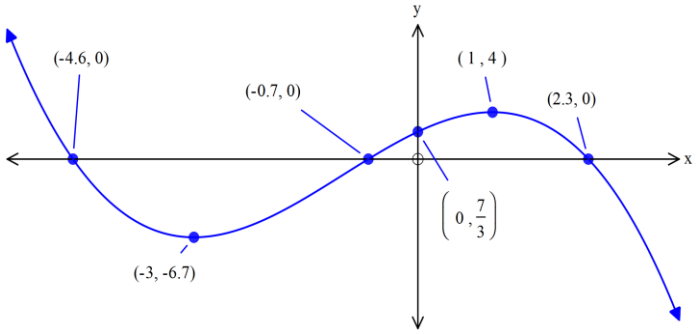


For #6 – 7: Use the graph below to identify the x-intercepts, y-intercept, local and absolute maxima and/or minima, and determine where the function is increasing, decreasing, and where the function is negative.

6.



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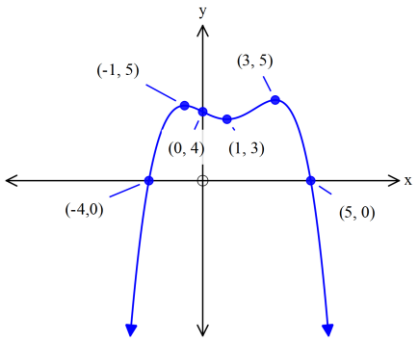
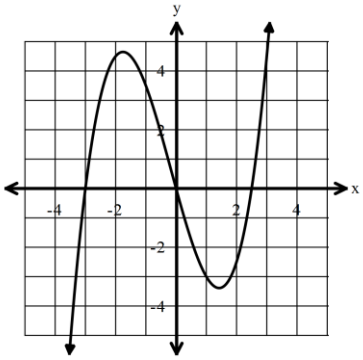
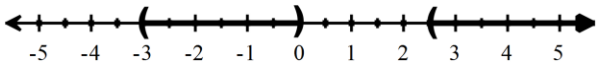


8. The function $f(x) = \frac{1}{2}x^3 + \frac{1}{4}x^2 - \frac{15}{4}x$ is graphed to the right. Over which intervals of x is the graph positive?



A.



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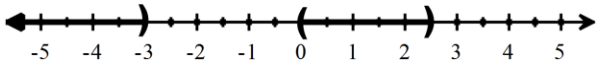

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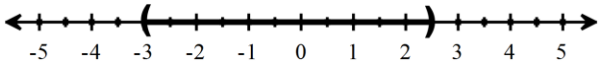
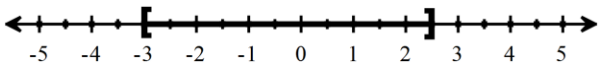


D.



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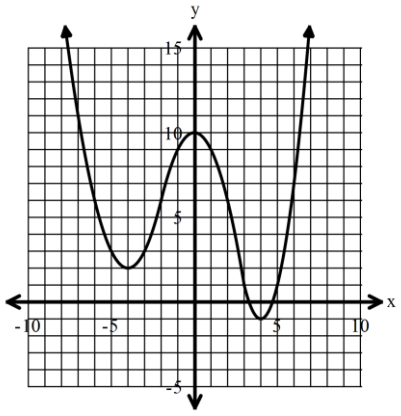
9. What are the values of the relative maxima and/or minima of the function graphed?

A. relative maxima: 0
relative minima: $-4, 4$

B. relative maxima: 10
relative minima: $-1, 2$

C. relative maxima: 3.3, 4.7
relative minima: 0

D. relative maxima: $2, 10$
relative minima: -1



10. List all the possible rational roots of the function $f(x) = 2x^3 + 11x^2 + 7x - 20$.

For #11-13: Rewrite each quadratic function in vertex form.

11. $y = x^2 + 8x - 3$ 12. $f(x) = 3x^2 + 12x + 5$ 13. $y = x^2 + 3x + 3$

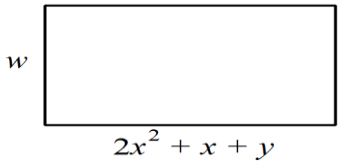
14. Factor: $4x^2 + 81$ 15. Simplify: $\left(i\sqrt{3} + 5\right)^2$ 16. Simplify: $(i\sqrt{2} - 4)(i\sqrt{2} + 4)$

17. Determine which expression would make the following statement true: $\frac{16x^4y^7}{?} = 4x^3y^{10}$

A. $4xy^{-3}$ B. $12x^{-1}y^{-3}$ C. $4x^7y^{17}$ D. $64x^7y^{17}$

18. In the figure to the right, the perimeter is $4x^2 + 8x - 2y$ units and the length is $2x^2 + x + y$. What is the width?

A. $w = 2x^2 - 7x - 3y$ B. $w = 2x^2 + 8x - 2$ C. $w = 6x - 4y$ D. $w = 3x - 2y$



19. Multiply $(2x^2 + 4x - 5)(-x^2 + 3x + 6)$

A. $-2x^4 + 2x^3 + 29x^2 + 9x - 30$ C. $-2x^4 + 9x^2 + 21x - 30$

B. $2x^4 + 10x^3 + 19x^2 + 9x - 30$ C. $-2x^4 + 24x^2 - 30$

20. Sketch the graphs of $f(x)$ and $g(x)$ on the same coordinate plane given the following information:

- $f(x)$ has zeros at -3, -1 and 2
- As $x \to -\infty$, $f(x) \to -\infty$ and as $x \to +\infty$, $f(x) \to +\infty$
- $f(x)$ has a local minima at approximately (1, -4) and a local maxima at approximately (-2, 3)
- $g(x) = \frac{1}{2}x - 1$

How many real solutions exist when f(x) = g(x)?

5.5 Practice Problems

For # 1 – 4: Decide whether the function is a polynomial function. If it is, write the function in standard form and state the degree, type, and leading coefficient.

1. $f(x) = 7 - 2x$ **2.** $g(x) = 2x - x^3 + 8$ **3.** $h(x) = x^4 - x^3$ **4.** $y = 2^x + 5$

For # 5 – 8: Describe the end behavior of the graph of the polynomial function by completing these statements: as $x \to -\infty$, $f(x) \to$ _?_ and $x \to +\infty$, $f(x) \to$ _?_.

5. $f(x) = -5x^3$ 6. $f(x) = 2x^5 - 7x^2 - 4x$ 7. $f(x) = 2x^8 + 9x^7 + 10$ 8. $f(x) = -12x^6 - 2x + 5$

For #9 – 12: Graph the polynomial function. State the domain and range, x-intercepts, y-intercept, local and absolute maxima and/or minima and determine when the function is increasing and decreasing.

9. $f(x) = -x^3 - 2$ 10. $g(x) = x^4 + 4x^3 + 3x^2 - 4x - 4$ 11. $f(x) = x^3 - 3x^2 + 6$ 12. $h(x) = -x^4 - 6x^3 - 3x^2 + 10x - 3$

For # 13 – 21: Write the expression as a complex number in standard form.

13. $(-4 - i) - (4 + 5i)$ 14. $(5 - 3i) + (-3 - 6i)$ 15. $3i(4 + 2i)$ 16. $-2i(3 - i)$

17. $(2 + i)(4 + 2i)$ 18. $-2i(1 + i)(2 + 3i)$ 19. $(2 - i)^2$ 20. $\frac{5}{3-2i}$ 21. $\frac{1+2i}{\sqrt{2}+i}$

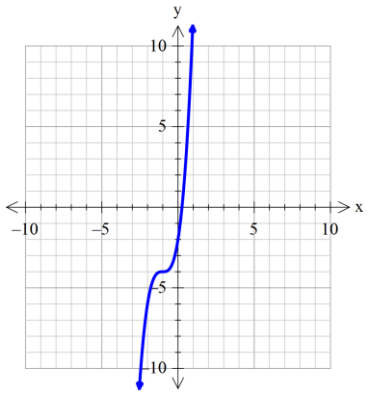
22. Which equation is obtained after the graph to the right is translated 2 units to the left and 3 units down?

A. $f(x) = 2(x - 1)^3 - 7$

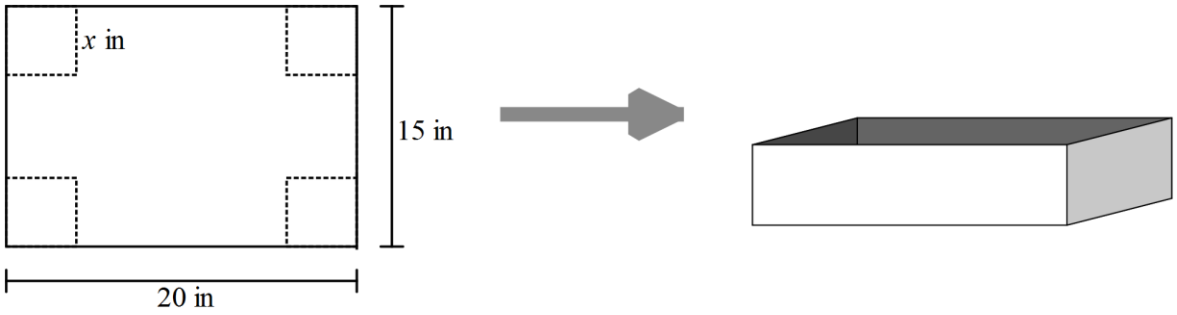
B. $f(x) = 2(x + 3)^3 - 3$

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

D. $f(x) = 2(x - 2)^3 - 3$



23. A manufacturer is going to package their product in an open rectangular box made from a single flat piece of cardboard. The box will be created by cutting a square out from each corner of the rectangle and folding the flaps up to create a box. The original rectangular piece of cardboard is 20 *inches* long and 15 *inches* wide. Write a function that represents the volume of the box.



A. $V(x) = x^3 - 35x^2 + 300x$

B. $V(x) = 4x^3 - 70x^2 + 300x$

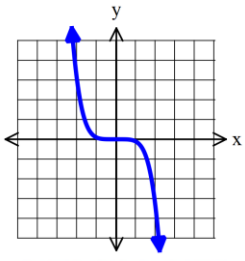
C. $V(x) = x^2 - 35x + 300$

D. $V(x) = 4x^2 - 70x + 300$

For # 24 – 27: Identify the function as odd, even, or neither:

24. $f(x) = 2x^5 + 4x^2$

25.



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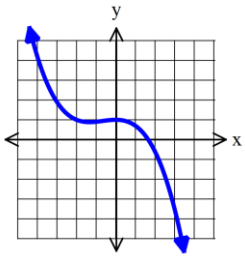


27. $g(x) = 6x^4 + 2x^2$

5.6 Practice Problems

For #1-4 Write a polynomial function *f* of least degree that has rational coefficients, a leading coefficient of 1 and the given zeros:

1. 2i and $2+\sqrt{3}$ 2. 3, 5*i*, $2-\sqrt{2}$ 3. 5 and $3+\sqrt{5}$ 4. 7, 4*i*, $3-\sqrt{3}$

For 5-6 write a cubic function whose graph passes through the points

5. (-3, 0), (-1, 0), (0, -5), (3, 0) 6. (-5, 0), (-3, 0), (0, 1), (6, 0).

For #7 – 8, simplify each expression.

7. $(10a^2 + 2a - 1) + (-4a^2 - a + 7)$ 8. $(n^2 + 5n - 9) + (3n^2 - 6n + 7)$

For #9 – 12: Factor each expression completely.

9) $343m^3 + 64n^3$ 10) $x^3 - 216y^3$ 11) $648a + 1029a^4$ 12) $216a^3 - 125b^3$

13)

$$2x - 3y = -14$$
$$3x - 2y = -6$$

If (x, y) is a solution to the system of equations above, what is the value of $x - y$?

A) -20

B) -8

C) -4

D) 8

14)

$$y = 3$$
$$y = ax^2 + b$$

In the system of equations above, a and b are constants. For which of the following values of a and b does the system of equations have exactly two real solutions?

A) $a = -2, b = 2$

B) $a = -2, b = 4$

C) $a = 2, b = 4$

D) $a = 4, b = 3$

15.

In one semester, Doug and Laura spent a combined 250 hours in the tutoring lab. If Doug spent 40 more hours in the lab than Laura did, how many hours did Laura spend in the lab?

16.

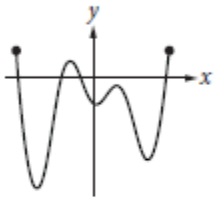
Uptown Cable, a cable TV provider, charges each customer $120 for installation, plus $25 per month for cable programming. Uptown's competitor, Downtown Cable, charges each customer $60 for installation, plus $35 per month for cable programming. A customer who signs up with Uptown will pay the same total amount for cable TV as a customer who signs up with Downtown if each pays for installation and cable programming for how many months?

F. 3
G. 6
H. 10
J. 18
K. 30

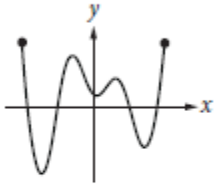
17.

If the function f has five distinct zeros, which of the following could represent the complete graph of f in the xy-plane?

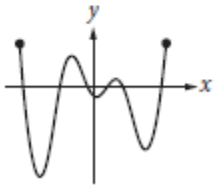
A)



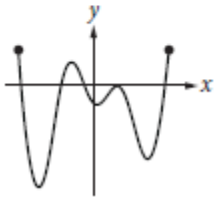
B)



C)



D)

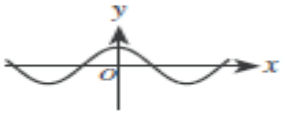


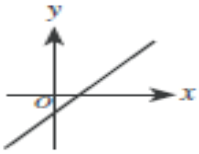
18

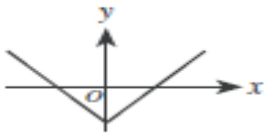
If $x + 1$ is a factor of $x^3 - 5x^2 + kx + 2$, then $k =$

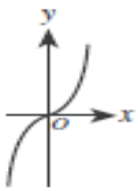
(A) –4
(B) –2
(C) 0
(D) 2
(E) 4

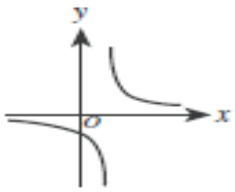
19. A function f is an *odd* function if and only if $f(-x) = -f(x)$ for every value of x in the domain of f. One of the functions graphed in the standard (x,y) coordinate plane below is an odd function. Which one?

A. 

D. 

B. 

E. 

C. 

Unit 5 Practice Test

Find the sum or difference.

1. $2w^2 - (6w^3 + 2w^2 - 3w - 1) + (-5w^3 + 9w - 8)$

2. $(4m^4 - m^2 + 5m) - 3(-2m^3 + m^2 - 2m + 6) + 2m^2$

Find the product.

3. $2s(6s - 1)(5s + 2)$

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

5. $(5q + 2)(-8q + 1)(q - 4)$

Factor the polynomial completely using any method.

6. $-3c^3 + 24$

7. $12x^3 - 6x^2 + 2x - 1$

8. $y^4 - 81$

9. $6a^4 + 13a^2 - 5$

10. $2ac^2 - 5bc^2 - 2ad^2 + 5bd^2$

Find the real-number solutions of the equation.

11. $27g^3 - 8 = 0$

12. $125q^4 - 27 = 125q^3 - 27q$

13. $2n^5 + 24n = 14n^3$

Divide using polynomial long division.

14. $(x^3 + 5) \div (x^2 + 3)$

15. $(6x^4 - 9x^3 - 19x^2 + 31x - 5) \div (2x^2 + x - 5)$

For #16 – 17: Are the following factors of the polynomial function?

16. $(x^4 + 5x^3 - 2x^2 - 4x + 4) \div (x + 3)$

17. $(2x^3 + 3x^5 + 1 - 5x) \div (x - 1)$

For #18 – 19: A polynomial *f* and a factor of *f* are given. Factor *f* completely.

18. $f(x) = 4x^3 + 8x^2 - 25x - 50$; $x + 2$

19. $f(x) = x^5 - 3x^4 - 4x^3 + x^2 - 3x - 4$; $x + 1$

For #20 – 21: A polynomial *f* and one zero of *f* are given. Find the other zeros of *f*.

20. $f(x) = 9x^3 + 45x^2 - 4x - 20$; -5

21. $f(x) = x^3 + x^2 - 13x + 3$; 3

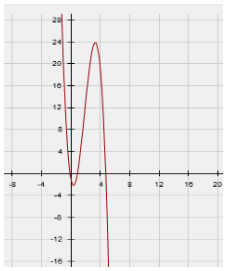
22. Find all zeros of the function: $f(x) = x^3 - 4x^2 - 7x + 10$

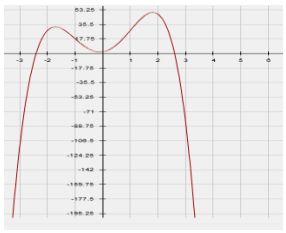
23. Find all zeros of the function: $g(x) = x^5 - x^4 - 7x^3 + 11x^2 - 8x + 12$

24. Match each graph below with the given equations. Do NOT use a graphing calculator!

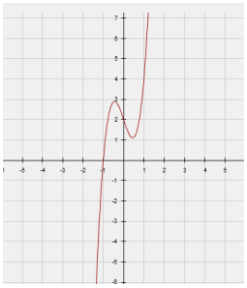
Equation options: i) $y = 5x^3 - 3x + 2$ ii) $y = -2x^3 + 11x^2 - 7x - 1$

iii) $y = x^4 - 7x^3 + 14x + 3$ iv) $y = -4x^4 - 7x^2 + 5x + 2$

a) 

b) 

c) 

d) 

25. Find all zeros of the function: $g(x) = 8x^3 + 28x^2 + 14x - 15$

Use a graphing calculator to graph the function. Then state the domain and range, x-intercepts, y-intercept, local and absolute maxima and/or minima, and determine when the function is increasing and decreasing.

26. $g(x) = 4x^3 - 8x^2 - 15x + 9$ **27.** $h(x) = -2x^4 + 3x^2 - 2$

Write a polynomial function *f* of least degree that has rational coefficients, a leading coefficient of 1, and the given zeros.

28. $1, 2, 4 + \sqrt{2}$ **29.** $5, 3, 4i$

For #30 – 31: Describe the end behavior of the graph of the polynomial function by completing these statements: as $x \to -\infty$, $f(x) \to$ _?_ and as $x \to +\infty$, $f(x) \to$ _?_ .

30. $f(x) = -4x^3$ **31.** $f(x) = -2x^5 - 7x^2 - 4x$

For #32 – 33, factor each expression completely.

32) $3(x-1)^2 + 5(x-1)$ 33) $x(x^2-4)^3 + 5(x^2-4)^2$

34) A cubic equation has *x*-intercepts of 2, -1, and 4, and a *y*-intercept of 10. Write an equation for this cubic.

35) A cubic contains the points (4, 0), (-2, 0), (0, -3), and (5, 0). Write an equation for this cubic.

For # 36 – 39: Write a polynomial function *f* of least degree that has rational coefficients, a leading coefficient of 1, and the given zeros.

36) $4, 5 + \sqrt{3}$ **37)** $4, i$ **38)** $-5, 0, -2i$ **39)** $8, 2 + i$

40) Sporting Goods For 1998 through 2005, the sales *S* (in billions of dollars) of sporting goods can be modeled by $S = 0.007t^3 + 0.1t^2 + 1.4t + 70$ where *t* is the number of years since 1998. In which year were sales about $78 billion?

41) Mail From 1995 to 2003, the amount of mail *M* (in billions of pieces) handled by the U.S. Postal Service can be modeled by $M = 0.05(t^4 - 18t^3 + 89t^2 - 32t + 3680)$ where *t* is the number of years since 1995. In which year were there about 204,000,000,000 pieces of mail handled?

a. Write a polynomial equation that can be used to answer the question.

b. List the possible whole-number solutions of the equation in part (a) that are less than or equal to 8.

c. Use synthetic division to determine which of the possible solutions in part (b) is an actual solution. Then answer the question in the problem statement.

d. Use a graphing calculator to graph and identify any additional real solutions of the equation that are reasonable.

42) Sketch the graphs of $f(x)$ and $g(x)$ on the same coordinate plane given the following information:

- $f(x)$ has zeros at $0, 2, 6$
- As $x \to -\infty$, $f(x) \to -\infty$ and as $x \to +\infty$, $f(x) \to +\infty$
- $f(x)$ has a local minimum at approximately $(4, -3)$ and a local maximum at approximately $(1, 1)$
- $g(x) = -x - 4$

How many real solutions exist when $f(x) = g(x)$?

Unit 5 Practice ANSWERS

5.0 Answers

1. $4b^2 - b + 6$ 2. $15n^2 - 3n - 1$ 3. $-5w^3 + 4w^2 - 5w - 3$ 4. $4y^2 - 9y + 7$ 5. $-2x^3 + 5x^2 + 4x + 6$

6. $6t^4 - t^3 + 2t^2 - 3t + 18$ 7. $-5h^3 + 5h^2 + 70h - 120$ 8. $x^3 - 49x$ 9. $2s^3 + 28s^2 + 18s - 648$

10. $2x^2 + x - 3$ 11. $3x^2 - 7x + 2$ 12. -4 & -8 13. No solution

14. 0 & -4 15. No Solution 16. -13

17. $4x^2 + 4x\sqrt{7} + 7$ 18. $y = 2(x - 2)^2 + 3$ 19. $6x^3 + 43x^2 + 37x - 30$ 20) 0 21) 2

5.1 Answers

1. $(4n - 3)(16n^2 + 12n + 9)$ 2. $(3g + 7)(9g^2 - 21g + 49)$ 3. $2(w + 3)(w^2 - 3w + 9)$

4. $(x + i\sqrt{7})(x - i\sqrt{7})(x + 6)$ 5. $(c + 3)(c - 3)(c + 4)$ 6. $(z + 1)(z - 1)(z - 2)(z + 2)$

7. $(x + i\sqrt{6})(x - i\sqrt{6})(x + \sqrt{6})(x - \sqrt{6})$ 8. $(c + 3)(c - 3)(c + 3i)(c - 3i)$ 9. $(x^3 + 2)(x^3 - 2)$

10. $3(2q - 3)(4q^2 + 6q + 9)$ 11. $(a^3 + 6)(a + 1)(a^2 - a + 1)$ 12. $2(b + 7)(b - 2)(b^2 + 2b + 4)$

13. -6 & 0 14. -5, -2, 5 15. $-5, \sqrt{3}, -\sqrt{3}$

16. a) V1 = $18\pi x^3$ V2 = $8\pi x^3$ V3 = $2\pi x^3$ b) $28\pi x^3 = 448\pi$ c) $2\sqrt[3]{2}$

16d) level 1: $12\sqrt[3]{2}$ft, $2\sqrt[3]{2}$ ft level 2: $8\sqrt[3]{2}$ ft, $2\sqrt[3]{2}$ ft level 3: $4\sqrt[3]{2}$ft, $2\sqrt[3]{2}$ft

17) $-(x + 3)(2x + 1)$ 18) $(x + 1)(x - 1)(x + 2)(x^2 - 2x + 4)$ 19) $(x + 3y)^2(2x^2 + 6xy - 5)$ 20) -1/12 $c^3 - 3c^2 + 5c + 1/6$ 21) D

5.2 Answers

1. $x + 7$ **2.** $x - 7 - \frac{13}{x + 5}$ **3.** $x^2 - 3x + 10$

4. $3x - 1 + \frac{8}{2x - 1}$ **5.** $8x + 5 + \frac{12x + 25}{x^2 - 3}$

6. $5x^2 + 17x + 31 + \frac{16x - 112}{x^2 - 3x + 4}$ **7.** $x + 3$

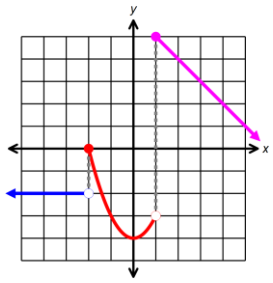
8. $x^2 - 2x + 6 + \frac{1}{x - 1}$ **9.** $x^3 + 2x^2 - 3x + 3 + \frac{-4}{x - 2}$

10. $2x^3 - 3x^2 + 3x - 3 + \frac{7}{x + 1}$

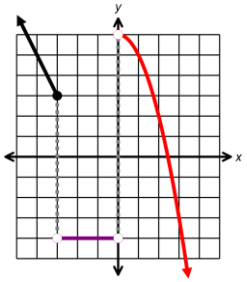
11. $2x^3 - 5x^2 + 6$

12. $x^3 + x^2 + 7x + 9 + \frac{96}{x - 7}$

13.



14.



15. -4/3 16. -5/3 & -2/3 17. 3/8 & ¾ 18. 2

5.3 Answers

1. $(x - 6)(x + 1)(x + 2)$ 2. $(x - 10)(x - 4)(x + 2)$ 3. $(x + 5)(x - 3)^2$ 4. $(x + 4)(3x - 1)(x - 9)$

5. 2 6. -9 & 12 7. - 2/5 & 1/3 8. 5 9. $-\sqrt{5}, \sqrt{5}$

10. -1, 1, 3 11. 2, 7, 3i, -3i 12. -4, 0, 2, 6

13. $-3, 2 \pm \sqrt{3}$ 14. -5, i, -i 15. -1, 1/2, i, -i

16) $3\sqrt{2}d^2 - 5d - 7$ 17) $11x^2 - 2x - 2$ 18) $3(1 - 2y)(1 + 2y + 4y^2)$ 19) C

5.4 Answers

1. -∞, -∞ 2. +∞ , -∞ 3. -∞, +∞ 4. Inc: $(-8,-4) \cup (0,\infty)$ Dec: $(-\infty,-8) \cup (-4,0)$

5. Inc: $(-12,-3) \cup (4,11)$ Dec: $(-\infty,-12) \cup (-3,4) \cup (11,\infty)$

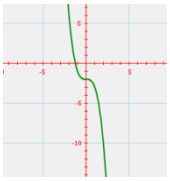
6. x-int: (-4.6, 0), (-0.7, 0), (2.3, 0)
y-int: $(0, \frac{7}{3})$
local max: (1,4)
Abs Max: none
Local Min: (-3, -6.7)
Abs Min: none
Inc: (-3, 1)
Dec: $(-\infty,-3) \cup (1,\infty)$
Negative: (-4.6, -0.7) ∪ (2.3, ∞)

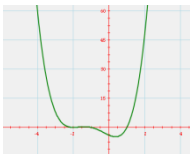
7. x-int: (-4, 0), (5, 0)
y-int: (0,4)
local max: none
Abs Max: (-1.5), (3,5)
Local Min: (1,3)
Abs Min: none
Inc: $(-\infty,-1) \cup (1,3)$
Dec: $(-1,1) \cup (3,\infty)$
Negative: $(-\infty,-4) \cup (5,\infty)$

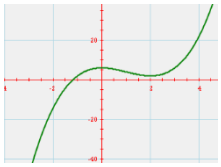
8. A 9. B
10. $\pm 1, \pm\frac{1}{2}, \pm 2, \pm 4, \pm 5, \pm\frac{5}{2}, \pm 10, \pm 20$
11. $y = (x+4)^2 - 19$
12. $f(x) = 3(x+2)^2 - 7$
13. $y = \left(x+\frac{3}{2}\right)^2 + \frac{3}{4}$
14. $(2x+9i)(2x-9i)$
15. $22 + 10i\sqrt{3}$
16. -18
17. A 18. D 19. A
20. 3 real solutions

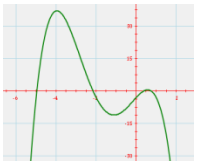
5.5 Answers

1. yes; $f(x) = -2x + 7$; linear; -2 2. Yes; $g(x) = -x^3 + 2x + 8$; cubic; -1 3. Yes; $h(x)=x^4 - x^3$; quartic; 1 4. No
5. +∞ , -∞ 6. -∞, +∞ 7. +∞, +∞ 8. -∞, -∞

9. 
D: all real #s
R: all real #s
x-int: -1.26
y-int: -2
max: none
min: none
Inc: never
Dec: (-∞,+ ∞)

10. 
D: all real #s
R: [-4.85, ∞)
x-int: -2, -1, 1
y-int: -4
local max: (-1.37, 0.35) Abs max: none
local min: (-2, 0) Abs Min: (0.37, -4.85)
Inc: (-2,-1.38),(.37, +∞)
Dec: (-∞,-2),(-1.38,.37)

11. 
D: all real #s
R: all real #s
x-int: -1.20
y-int: 6
local max: (0, 6)
local min: (2, 2)
Inc: (-∞,0),(2, +∞)
Dec: (0,2)

12. 
D: all real #s
R: (-∞, 37.04]
x-int: 0.39, 0.74, -2.16, -4.97
y-int: -3
Abs max: (-3.96, 37.04) local max:(0.57, 0.51)
local min: (-1.11, -11.11)
Inc: (-∞,-4),(-1, 0.57)
Dec: (-4,-1),(0.57,+ ∞)

13. -8 – 6i 14. 2 – 9i 15. -6 + 12i 16. -2 – 6i 17. 6 + 8i 18. 10 + 2i
19. 3 – 4i 20. $\frac{15+10i}{13}$ 21. $\frac{\sqrt{2}-i+2i\sqrt{2}+2}{3}$ 22. C 23. B 24. Neither 25. Odd 26. Neither 27. Even

5.6 Answers

1. $x^4 - 4x^3 + 5x^2 - 16x + 4$ 2. $x^5 - 7x^4 + 39x^3 - 181x^2 + 350x - 150$
3. $x^3 - 11x^2 + 34x - 20$ 4. $x^5 - 13x^4 + 64x^3 - 250x^2 + 768x - 672$
5. $y = \frac{5}{9}(x+3)(x+1)(x-3)$ 6. $y = -\frac{1}{90}(x+5)(x+3)(x-6)$ 7. $6a^2 + a + 6$
8. $4n^2 - n - 2$ 9. $(7m+4n)(49m^2 - 28mn + 16n^2)$ 10. $(x - 6y)(x\text{^}2 + 6xy + 36y^2)$
11. $3a(6 + 7a)(36 - 42a + 49a^2)$ 12. $(6a - 5b)(36a^2 + 30ab + 25b^2)$ 13. C 14. B 15. 105 hours
16. G 17. D 18. A 19. E

Practice Test Answers

1. $-11w^3 + 12w - 7$ 2. $4m^4 + 6m^3 - 2m^2 + 11m - 18$ 3. $60s^3 + 14s^2 - 4s$
4. $2x^7 + 6x^6 - 3x^5 + 3x^4 + x$ 5. $-40q^3 + 149q^2 + 46q - 8$ 6. $-3(c - 2)(c^2 + 2c + 4)$
7. $(6x^2 + 1)(2x - 1)$ 8. $(y + 3i)(y - 3i))(y + 3)(y - 3)$ 9. $(3a^2 - 1)(2a^2 + 5)$
10. (c-d)(c + d)(2a – 5b) 11. 2/3 12. -3/5, 1
13. $0, \sqrt{3}, -\sqrt{3}, 2, -2$ 14. $x + \frac{-3x+5}{x^2+3}$

15. $3x^2 - 6x + 1$

16. No

17. No

18. $(x + 2)(2x + 5)(2x - 5)$

19. $(x + 1)^2(x - 4)(x^2 - x + 1)$

20. -2/3, 2/3

21. $-2 - \sqrt{5}, -2 + \sqrt{5}$

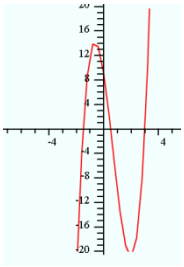
22. -2, 1, 5

23. -3, 2

24. a) ii b) iv c) iii d) i

25. -5/2, -3/2, 1/2

26.



D: $(-\infty, +\infty)$

R: $(-\infty, +\infty)$

x-int: -1.5, 0.5, 3

y-int: 9

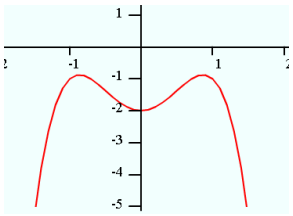
local max: (-0.64, 14.28)

local min: (1.97, -21.01)

Incr: $(-\infty, -.69), (2, +\infty)$

Decr: (-.69,2)

27.



D: $(-\infty, +\infty)$

R: $(-\infty, -0.88)\ (-\infty, -0.88\ )0.88$

x-int: none

y-int: -2

local max: (-0.87, -0.88) & (0.87, -0.88)

local min: (0, -2)

Incr: $(-\infty, -.85), (-2, .85)$

Decr: $(-.85, -2), (-2, +\infty)$

28. $F(x) = x^4 - 11x^3 + 40x^2 - 58x + 28$

29. $F(x) = x^4 - 8x^3 + 31x^2 - 128x + 240$

30. $+\infty$, $-\infty$

31. ∞ , $-\infty$

32. $(x - 1)(3x + 2)$

33. $(x + 2)(x - 2)\ (x + 2)(x - 2)(x^3 - 4x + 5)$

34. $y = 5/4(x - 2)(x + 1)(x - 4)$

35. $y = -3/40(x - 4)(x + 2)(x - 5)$

36. $f(x) = x^3 - 14x^2 + 62x - 88$

37. $F(x) = x^3 - 4x^2 + x - 4$

38. $f(x) = x^4 + 5x^3 + 4x^2 + 20x$

39. $f(x) = x^3 - 12x^2 + 37x - 40$

40. 2002

41. a) $t^4 - 18t^3 + 89t^2 - 32t - 400$

41b) $\pm 1, \pm 2, \pm 4, \pm 5, \pm 8$

41c) 4; 1999

41d) ≈ 6.4 or 2001

42) 1 real solution