Algebra 2 Name:_____

Unit 6 – Day 1 – Evaluating and Terminology of Polynomial Functions Period:_____Date:_____

Decide whether the function is a polynomial function. ***If so, write it in standard form and state its degree, type, and leading coefficient.***

1. $h(x) = -\frac{5}{2}x^3 + 3x - 10$

2. $f(x) = 6x + 8x^4 - 3$

3. $h(x) = x^3\sqrt{10} + 5x^{-2} + 1$

Use direct substitution to evaluate the polynomial function for the given value of x.

4. $f(x) = 8x + 5x^4 - 3x^2 - x^3; x = 2$

5. $g(x) = 4x^3 - 2x^5; \quad g(-3)$

Use synthetic substitution to evaluate the polynomial function for the given value of x.

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

7. $g(x) = x^3 + 8x^2 - 7x + 35; x = -6$

8. $h(x) = -8x^3 + 14x - 35; x = 4$

9. $f(x) = -2x^4 + 3x^3 - 8x + 13; x = 2$

10. $g(x) = 6x^5 + 10x^3 - 27; x = -3$

11. Describe and correct the error n evaluating the polynomial function $f(x) = -4x^4 + 9x^2 - 21x + 7$ **when** $x = -2$.

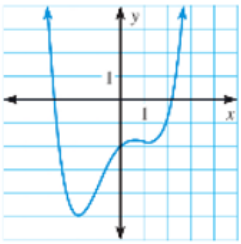
−2	−4	9	−21	7
		8	−34	110
	−4	17	−55	117

Algebra 2 Name:_____

Unit 6 – Day 2 – Positive/Negative Intervals, End Behavior, and Graphing Period:_____Date:_____

Describe the degree as even or odd then state if the leading coefficient is positive or negative for the polynomial function whose graph is shown.

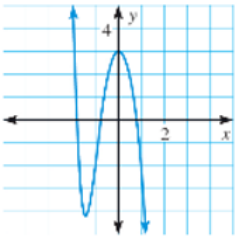
1.



Degree: _____

Leading Coefficient: _____

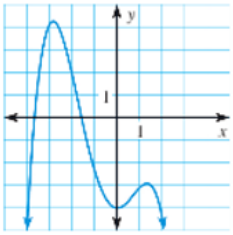
2.



Degree: _____

Leading Coefficient: _____

3.



Degree: _____

Leading Coefficient: _____

Describe the end behavior of the graph of the polynomial function by completing the statements.

4. $f(x) = -2x^3 + 7x - 4$

$f(x) \to$ _____ $as\ x \to -\infty\ and$

$f(x) \to$ _____ $as\ x \to \infty$

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

$f(x) \to$ _____ $as\ x \to -\infty\ and$

$f(x) \to$ _____ $as\ x \to \infty$

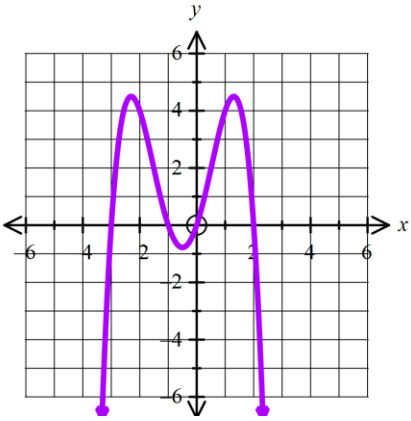
6. $f(x) = 3x^{10} - 16x$

$f(x) \to$ _____ $as\ x \to -\infty\ and$

$f(x) \to$ _____ $as\ x \to \infty$

Find the positive and negative intervals:

7.

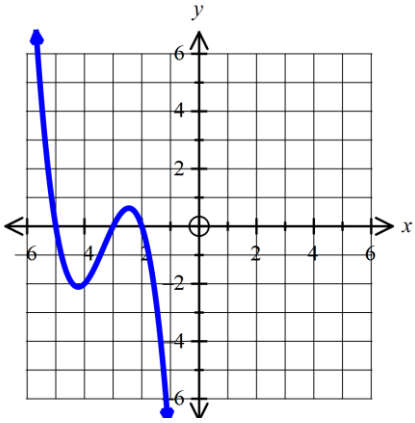


Zeros: _____

Positive: _____

Negative: _____

8.



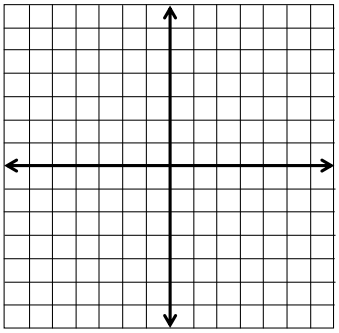
Zeros: _____

Positive: _____

Negative: _____

Graph the polynomial functions. State the Degree, Leading Coefficient, Domain, Range, End Behavior, and the Intervals where the function is positive and negative.

9. $f(x) = x^3 - 4x$



Positive: _____

Negative: _____

Degree: _____

Leading coefficient: _____

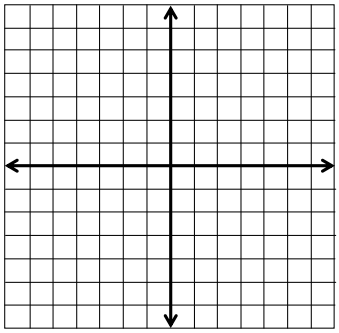
Domain: _____

Range: _____

$f(x) \to$ _____ $as\ x \to -\infty\ and$

$f(x) \to$ _____ $as\ x \to \infty$

10. $f(x) = -x^3 + 3x^2 - 2x + 5$



Positive: _____

Negative: _____

Degree: _____

Leading coefficient: _____

Domain: _____

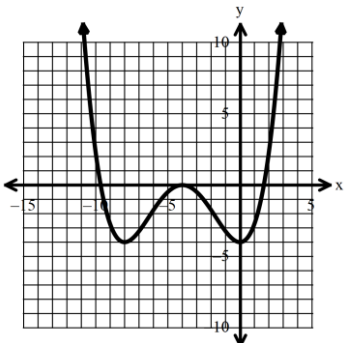
Range: _____

$f(x) \to$ _____ $as\ x \to -\infty\ and$

$f(x) \to$ _____ $as\ x \to \infty$

Algebra 2
UNIT 6: Day 3 Worksheet

Name:_____
Period:_____Date:_____



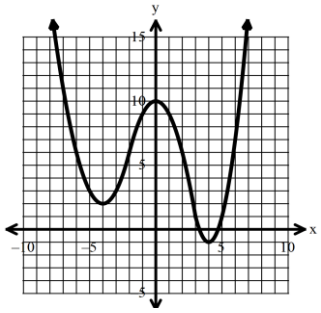
1. State where the function is increasing and decreasing.

A. Never Increasing , Decreasing: $(-\infty, +\infty)$

B. Increasing: $(-8, 0) \cup (0, +\infty)$, Decreasing: $(-\infty, -8)$

C. Increasing: $(-\infty, -8) \cup (0, 8)$, Decreasing: $(-8, 0)$

D. Increasing: $(-8, -4) \cup (0, +\infty)$, Decreasing: $(-\infty, -8) \cup (-4, 0)$



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

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

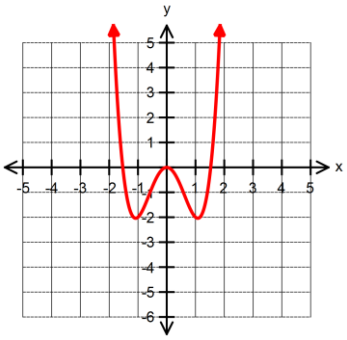
B. relative maxima: 10, relative minima: $-1, 2$

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

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

<u>For the following, state the relative maxima/minima, state when it is increase and decreasing, and the end behavior.</u>

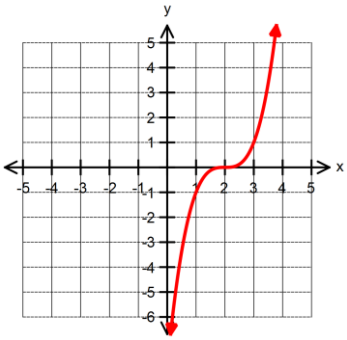
3.



Maxima: _____
Minima: _____
Increasing: _____
Decreasing: _____

$f(x) \to$ ____ **as** $x \to -\infty$
and $f(x) \to$ _____ **as** $x \to \infty$

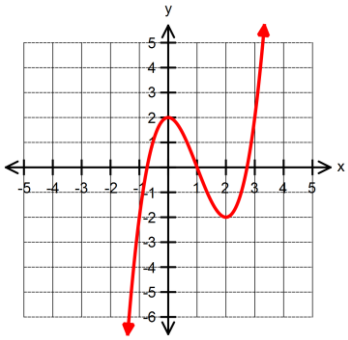
4.



Maxima: _____
Minima: _____
Increasing: _____
Decreasing: _____

$f(x) \to$ ____ **as** $x \to -\infty$
and $f(x) \to$ _____ **as** $x \to \infty$

5.

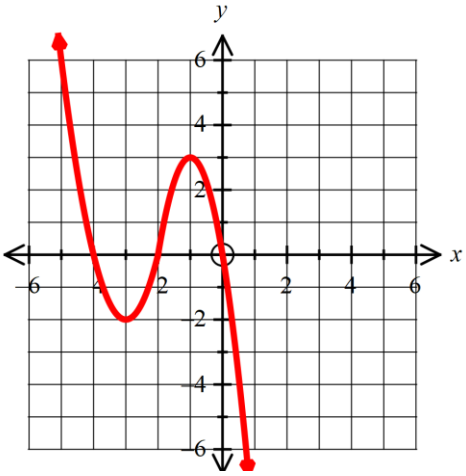


Maxima: _____
Minima: _____
Increasing: _____
Decreasing: _____

$f(x) \to$ ____ **as** $x \to -\infty$
and $f(x) \to$ _____ **as** $x \to \infty$

<u>Using the graph below, find all of the following.</u>

6.

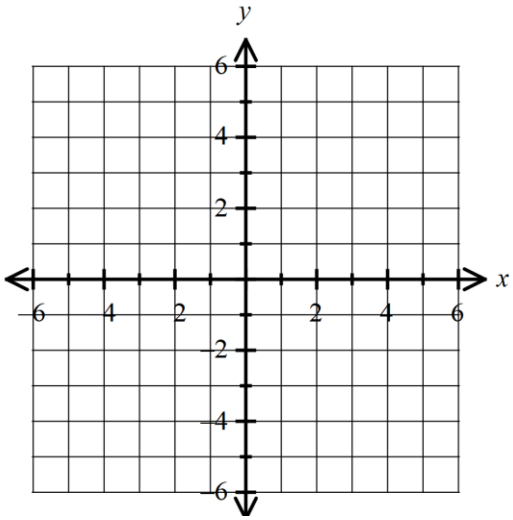


Local Min	
Local Max	
Increasing	
Decreasing	
Positive	
Negative	
End Behavior	$f(x) \to$ _____ as $x \to -\infty$ and $f(x) \to$ _____ as $x \to \infty$

Keep Going →

Sketch a graph of the following polynomial functions by using their local minima or maxima, describe the end behavior and the intervals in which the function is increasing or decreasing.

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



Local Min	
Local Max	
Increasing	
Decreasing	
Positive	
Negative	
End Behavior	$f(x) \to$ _____ as $x \to -\infty$ and $f(x) \to$ _____ as $x \to \infty$

x	–3	–2	–1	0	1	2	3
f(x)							

Algebra 2 **Name:**_____

Unit 6 – Day 4 – Add, Subtract and Multiply Polynomials **Period:**_____**Date:**_____

<u>Find the sum or difference</u>

1. $(x^2-3x+5)-(-4x^2+8x+9)$

2. $(2a^2-8)-(a^3+4a^2-12a+4)$

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

4. $(8v^4-2v^2+v-4)-(3v^3-12v^2+8v)$

<u>Find the product of the polynomials.</u>

5. $(3z+1)(z-3)$

6. $(w+4)(w^2+6w-11)$

7. $(2a-3)(a^2-10a-2)$

8. $(-x^2+4x+1)(x^2-8x+3)$

<u>Find the product of the binomials.</u>

9. $(3p+1)(p+3)(p+1)$

10. $(b-2)(2b-1)(-b+1)$

Algebra 2 Name:_____

Unit 6 – Day 5 – Multiply Polynomials using Special Product Patterns Period:_____Date:_____

***Describe* and *correct* the error in simplifying the expression.**

1.

$$(2x - 7)^3 = (2x)^3 - 7^3$$
$$= 8x^3 - 343$$

Find the product of the expressions.

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

3. $(w-9)^2$

4. $(y+4)^2$

5. $(2c+5)^2$

6. $(5p-3)(5p+3)$

7. $(7x-y)^3$

8. $(3x+7y)^3$

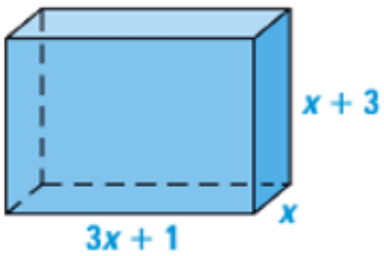
9. ★ **MULTIPLE CHOICE** Which expression is equivalent to $(3x - 2y)^2$?

Ⓐ $9x^2 - 4y^2$ Ⓑ $9x^2 + 4y^2$

Ⓒ $9x^2 + 12xy + 4y^2$ Ⓓ $9x^2 - 12xy + 4y^2$

10. Write the figure's volume as a polynomial in standard form.

$V = \ell wh$



Algebra 2
Unit 6 – Day 6 – Factor and Solve Polynomial Equations

Name:_____
Period:_____Date:_____

Factor the polynomials completely.

1. $14x^2 - 21x$

2. $c^3 + 9c^2 + 18c$

Sum or Difference of Cubes – Factor the polynomials completely

3. $y^3 - 64$

4. $-5z^3 + 320$

Factoring by Grouping – Factor the polynomials completely.

5. $y^3 - 7y^2 + 4y - 28$

6. $3m^3 - m^2 + 9m - 3$

Quadratic Form – Factor the polynomials completely.

7. $x^4 - 25$

8. $a^4 + 7a^2 + 6$

Solve to find the real-number solutions of the equations.

9. $y^3 - 5y^2 = 0$

10. $g^3 + 3g^2 - g = 3$

11. $m^3 + 6m^2 - 4m - 24 = 0$

12. $4w^4 + 40w^2 - 44 = 0$

Algebra 2 – 2020 Name:_____

Unit 6 – Unit Review Period:_____Date:_____

For 1 – 2, use synthetic substitution to evaluate the function.

1. $f(x) = 7x^3 + 3x^2 - 7x + 3$; when $x = 3$

2. $f(x) = 8x^3 - 2x^2 - 3x - 5$; $f(5)$

For 3 – 4, find the end behavior of each function.

3. $f(x) = -x^3 + 7x + 4$

$f(x) \to$ _____ $as\ x \to -\infty$, $f(x) \to$ _____ $as\ x \to \infty$

$f(x) \to$ _____ $as\ x \to -\infty$, $f(x) \to$ _____ $as\ x \to \infty$

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

For 5 – 6, decide whether the function is polynomial function. If so, state its degree, type, number of terms, and the leading coefficient.

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

Polynomial Function: _____

Degree: _____

Type: _____

Leading Coefficient: _____

Number of terms: _____

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

Polynomial Function: _____

Degree: _____

Type: _____

Leading Coefficient: _____

Number of terms: _____

For 7 – 9, find the sum or difference.

7. $(6q^5 + 8q^2 + 3) + (8q^5 - 3q^2 - 7)$

8. $(3x + 7) - (5x^2 - 6x + 2)$

9. $(-8s^2 - 7s) - (-9s - 1 - 2s^2)$

For 10 – 12, find the product.

10. $(u + 4)(u^2 - 3u + 3)$

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

12. $(2x - 1)^3$

For 13 – 17, factor the following polynomials completely.

13. $n^5 + 216n^2$

14. $2z^8 - 6z^6 - 80z^4$

15. $4x^3 - 8x^2 + 3x - 6$

16. $x^8 - 81$

17. $64x^3 - 27y^3$

For 18 – 21, find the real number solution for each equation.

18. $x^4 + 5 = 6x^2$

19. $x^3 + 3x^2 = 28x$

20. $x^3 + 2 = 2x^2 + x$

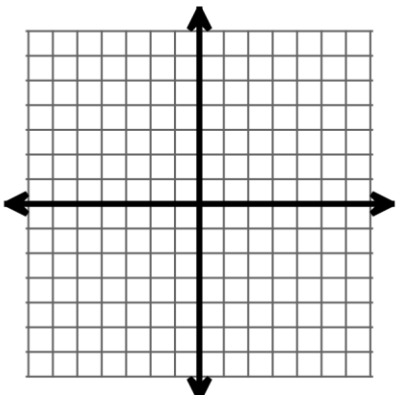
21. $36y^3 + 48y^2 + 16y = 0$

For 22 – graph the function, find any local mins or maxs, then fill out the table to the right.

22. $y = x^4 - 4$

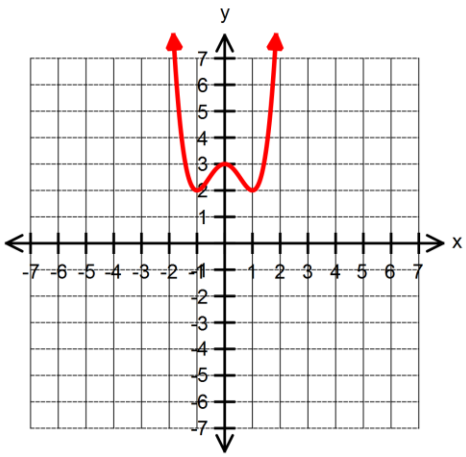
Mins: _____

Max: _____



x	-3	-2	-1	0	1	2	3
$f(x)$							

23. Given the graph to the right, approximate the following:



Min Values: _____ Max Value: _____

Increasing: _____ Decreasing: _____

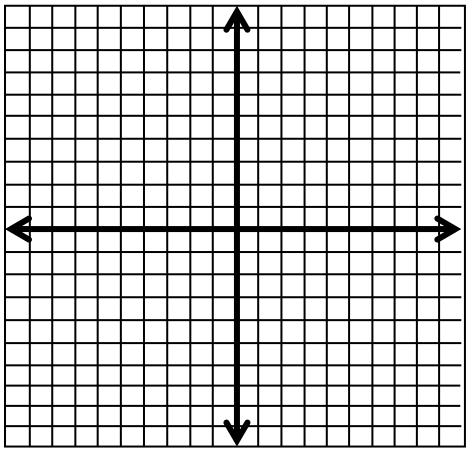
Positive: _____ Negative: _____

End Behavior: $f(x) \to$ _____ $as\, x \to -\infty$, $f(x) \to$ _____ $as\, x \to \infty$

<u>Approximate for the following graph.</u>

24. $f(x) = x^3 + 5x^2 + 5x - 2$

x	-3	-2	-1	0	1	2	3
$f(x)$							



Local Mins: _____ Local Maxs: _____

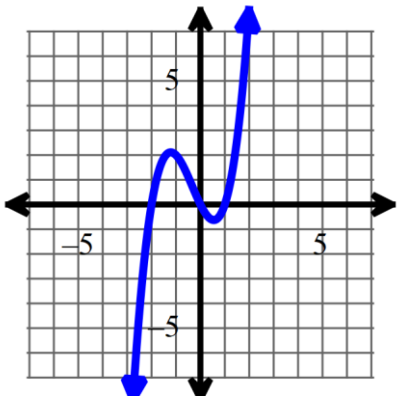
Increasing: _____ Decreasing: _____

Positive: _____ Negative: _____

End Behavior: $f(x) \to$ _____ $as\, x \to -\infty$, $f(x) \to$ _____ $as\, x \to \infty$

<u>Multiple Choice Section:</u>

25. The function, $f(x)$, is graphed below. Which of the following statements are true? Select **<u>all</u>** that apply.



A. $f(x)$ is positive on the interval $0 < x < 1$.

B. $f(x)$ is positive on the interval $-2 < x < 0$.

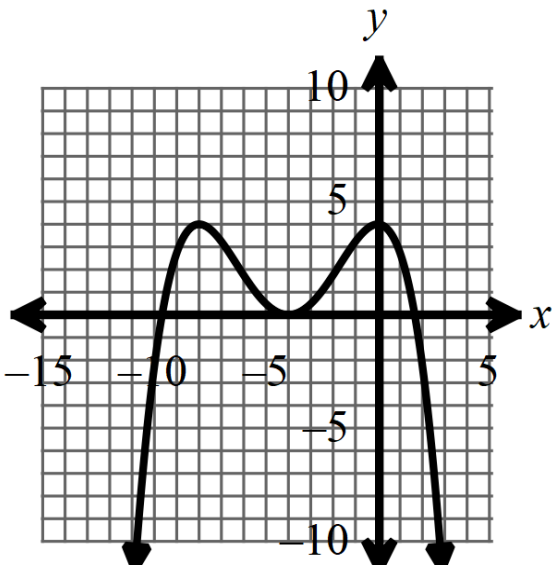
C. $f(x)$ is positive on the interval $x > 1$.

D. $f(x)$ is negative on the interval $-2 < x < 0$ . .

E. $f(x)$ is negative on the interval $x < -2$.

F. $f(x)$ is negative on the intervals $0 < x < 1$

26. State where the function is increasing and decreasing.



A. Increasing: $(-9.657, -4) \cup (-4, 1.657)$
Decreasing: $(-\infty, -9.657) \cup (1.657, +\infty)$

B. Increasing: $(-8, 0) \cup (0, +\infty)$
Decreasing: $(-\infty, -8)$

C. Increasing: $(-\infty, -8) \cup (0, 8)$
Decreasing: $(-8, 0)$

D. Increasing: $(-\infty, -8) \cup (-4, 0)$
Decreasing: $(-8, -4) \cup (0, +\infty)$

27. Which of the following expressions must be subtracted from $(4x^3 - 5x^2 + 6x - 3)$ to result in $(6x^3 - 2x^2 + 4x + 7)$?

A. $-2x^3 - 3x^2 + 2x - 10$

B. $2x^3 + 3x^2 - 2x + 10$

C. $-2x^3 - 7x^2 + 10x + 4$

D. $2x^3 - 7x^2 + 10x + 4$

28. Find the product: $(x - 1)(x + 5)(x - 3)$

A. $x^3 + 15$

B. $x^3 + x^2 - 17x + 15$

C. $x^3 - 3x^2 - 13x - 15$

D. $x^3 + 7x^2 - 7x + 15$

29. Factor completely: $x^4 - 13x^2 + 36$

A. $(x^2 - 9)(x^2 + 4)$

B. $(x - 3)(x + 3)(x + 4)(x - 4)$

C. $(x - 3)(x + 3)(x + 2)^2$

D. $(x - 3)(x + 3)(x + 2)(x - 2)$