Algebra 2 Module 6 Powers and Polynomials

Section 6.1 Defining Polynomials

Practice Problems 6.1

For Problem 1-20, if the expression is a polynomial, write it in standard form. Then identify the polynomial by degree, lead coefficient, and number of terms. For more than three terms, name it a polynomial.

	Standard Form	Lead Coefficient	Name by Degree & Terms
$7+cd^4-2d^2g$			
$\frac{1}{4}$			
$4s-s^2-3s^4$			
$4p^3-2p^4$			
$11-3q^2t+6r$			
$a^2b^5+6-3ab$			
$-m^3+2m-m+8$			
$4hjk-7h^2j^3+3j^2k^2$			
$7xy^3$			
$13q^{-4}+6q$			
$\frac{5m}{7n}$			
$8m^2n^3+2$			
$y+5y^3-2y^2$			
$12p^2q^3+2$			
$6-x^2+3x^4-4x$			
$10xy^5z$			
$9rt+4t^3$			
$13x^2-7x^5-4x$			
$5ab+3b^2-2a^3$			
$6a^2b^3+3$			

Section 6.2 Combining Like Terms
Practice Problems 6.2

For Problem 1-5, match the description to the term.

$$5x^3 - 4x + 2$$

1.	Name the polynomial by the number of terms.	a) Lead Coefficient
2.	What is another name for the 2 in the polynomial.	b) Degree
3.	What does the exponent of 3 determine?	c) Binomial
4.	What is another name for 5?	d) Trinomial
5.	Name of a polynomial with one less term.	e) Constant

For Problem 6-10, combine like terms to simplify the polynomial.

6. $-5x^4 + 3x^3 + x - x + 5x^4 - 2x^2$

7. $5 - 3x^5 + 7x^2 + 2x^3 - 8x^2 + x^4 + x^5 + 3 + 3x^4 + 7x^2 - 8 - 4x^3$

8. $6 - m + 2m^5 + 7 - 6m^4 + m - 7 + 3m - 5m^2 + 2m^2 - 3m^5$

9. $1 + 1 + 2x^2 + y + y^2 + x + y^2 - 3$

10. $2y^2 - 5 + 2x^2 + 5 + x + y + x - y$

For Problem 11 and 12, tell whether each description is true or false for the expression.

11. $5a^6 + 9a^2 + 8a + 3$

    Degree: 6

    Lead Coefficient: 9

    Number of terms: 4

    Name by the number of terms: Trinomial

12. $7x^5r^3 - 8x^6$

Degree: 6

Lead Coefficient: -8

Number of terms: 4

Name by the number of terms: Trinomial

For Problem 13-16, add or subtract the polynomials.

13. $(-6m^2 + 8 + 3m^3) + (-8m^3 + 6 + 8m^2)$

14. $(6 - 3n^4 + 8n^2) - (-3n^2 - 4n^3 - 6)$

15. $(-4 - 3x^3) + (-5 - 8x^2) - (2 + 2x^4)$

16. $(5x^4y + 5x^4 - 8y^3) - (x^4y - 5y^2 + 2x^4)$

For Problem 17-20, find the degree and lead coefficient of the expression and write it in standard form.

17. $4y^3 + 3x^2y^2 - 2x$

18. $5x^4 + x^5 - 22 + 6x^2 - 3x^3$

19. $-14xyz + 22x^2 - 14x^3y + z$

20. $-5t^2s^2 - 2ts^2 + 3ts - 5$

Section 6.3 Multiplying Polynomials

Practice Problems 6.3

For Problem 1-4, multiply the polynomials.

1. $-4ab(3a-6b)$

2. $-2m^2n^3(3n-mn+6n^3)$

3. $2xy(6x^2+5y)$

4. $-\frac{2}{3}x^3(-9x^3+3x+12)$

For Problem 5-8, multiply using the distributive property and simplify if possible.

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

6. $(a^3+b)(4a^3-6ab-2b^2)$

7. $(2x^2-4y^2)(2x+3xy-y)$

8. $(3x^4y^2-6xy^3)(4xy^5)$

For Problem 9-11, multiply using long multiplication and simplify if possible.

9. $(3x^3y+9)(2x+4y^3)$

10. $(3x^3y+1)(3xy^3-1)$

11. $(-2x^3+2x^2-4x)(x^2+6)$

For Problem 12-14, multiply using a rectangular array.

12. $(2x^2+3y^2)(3x+2xy-5y)$

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

14. $(x^2 - 2)(-2x^2 + 3x - 7)$

For Problem 15-20, solve the word problem.

15. Find the missing monomials in the rectangular array.

	$2x^2$	$-3x$	$+4$
x		$-3x^2$	
-4			-16

16. What is the polynomial solution from Problem 15 written in standard form? What is the degree of the polynomial?

17. Find the missing monomials in the rectangular array.

		$-5x$	
x	$2x^3$		$-x$
	$8x^2$		-4

18. Write the polynomial for the area in Problem 17 in standard form. What is the degree and what is the lead coefficient of the polynomial?

19. Find the missing monomials in the rectangular array.

	$3x^5$	$-2x^4$	$4x^3$
	$-12x^3$	$8x^2$	$-16x$

20. Write the polynomial for the area in Problem 19 in standard form and tell the number of terms.

Section 6.4 Factoring Polynomials

Practice Problems 6.4

For Problem 1-10, simplify the polynomial by finding the Greatest Common Monomial.

1. $5x^2 - 10$

2. $3x^2 - 15x$

3. $10m^2 - 100$

4. $5x^3 - 10y + 20x^2y^2$

5. $-6x^2 + 12x^3$

6. $4mn - 8m^2n^3 + 10m^3n^2$

7. $5xy - 7z$

8. $3a^2b + 9ab^2 - ab$

9. $16wx^2 - 4yxz^3$

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

For Problem 11-19, solve the equation. If possible, factor firstly.

11. $x^2 + 7x = 0$

12. $x^2 = 5x$

13. $x^2 - 3x - 10 = 0$

14. $3x^2 - 22x - 16 = 0$

15. $42x^2 - 192x - 90 = 0$

16. $x^2 - 3x - 28 = 0$

17. $2x^2 + 12x + 16 = 0$

18. $x^2 - 32 = 4$

19. $8x^2 - 2x = 0$

For Problem 20, solve the word problem.

20. Kinston, Payton and Daytona are born a year apart. Kinston is the oldest and Daytona is the youngest. The sum of the square of each of their ages is 50. How old is each person?

Section 6.5 Special Cases of Factoring

Practice Problems 6.5

For Problem 1-6, factor using the difference of squares, and multiply to check your work.

1. $49x^2 - 16y^2$

2. $m^2 - n^2$

3. $36a^2b^2 - 100x^2y^2$

4. $x^2 - 25$

5. $y^2 - 9$

6. $x^2 + y^2$

For Problem 7-10, factor using the difference of cubes, and multiply to check your work.

7. $8m^3 - 64$

8. $x^3 - 8$

9. $27y^3 - 125x^3$

10. $m^3 - n^3$

For Problem 11-14, factor using the sum of cubes and check your work.

11. $8m^3 + 64$

12. $x^3 + 8$

13. $27y^3 + 125x^3$

14. $m^3 + n^3$

For Problem 15-17, factor by grouping.

15. $12x^3 - 6x^2 + 4x - 2$

16. $10x^4 - 5x^3 + 4x - 2$

17. $6x^3 - 10x - 3x^2 + 5$

For Problem 18-20, solve the word problem.

18. Kylee has two sisters named Kiara and Kiana. They were all born on the same date, but in different years. One was born two years before Kylee, and the other five years after. If the product of Kylee's sisters' ages is 120, how old will Kylee and each sister be on their next birthday?

19. Find two consecutive even integers with a product of 440.

20. Find two consecutive integers with a product of 240.

Section 6.6 Synthetic Division

Practice Problems 6.6

For Problem1-5, use long division to divide the polynomials.

1. $(3x^2 + 9x + 1) \div (x + 1)$

2. $(x^2 - 2x - 15) \div (x + 3)$

3. $(x^2 - 2x - 15) \div (x - 5)$

4. $(x^2 - 2x - 15) \div (x - 1)$

5. $(x^3 + 6x^2 - 5x + 20) \div (x^2 + 4)$

For Problem 6-10, use synthetic division to divide the polynomials. Determine if the factor yields a zero of the equation represented by the first expression which is the dividend.

6. $(x^3 - 7x + 6) \div (x - 2)$

7. $(2x^2 + 6x + 5) \div (x + 1)$

8. $(x^3 - 28x - 10) \div (x + 3)$

9. $(x^3 - 28x - 48) \div (x + 2)$

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

For Problem 11-20, solve the word problem.

11. Find the remainder of $f(x) = 2x^3 + 2x - 1$ divided by $x - 1$.

12. The Remainder Theorem says $f(x)$ divided by $x - k$ has a remainder $r = f(k)$. What is k in Problem 11. What is r?

13. Use the Remainder Theorem to evaluate $f(x) = 2x^3 - 2x^2 + x - 1$ at $x = 3$.

14. Find $f(3)$. Is this the same as the remainder in Problem 13?

15. If you divide $x^3 + 2x^2 - 5x - 6$ by $x + 3$, what is k? What is $f(k)$?

16. Now that you know $f(k)$ from Problem 16, and you know that the Remainder Theorem says that $f(k) = r$, what is r? The dividend for Problem 16 is $f(x) = x^3 + 2x^2 - 5x - 6$ while the divisor is $x + 3$. Write the trinomial that is the quotient.

17. Factor the trinomial that you got in Problem 16 to find two other factors of the function $f(x) = x^3 + 2x^2 - 5x - 6$. One factor is $x + 3$. This is the one you originally divided by. What are the other two factors?

18. Multiply the three factors from Problem 17 together to make sure they equal $f(x) = x^3 + 2x^2 - 5x - 6$.

19. According to the Factor Theorem, if $(x - k)$ is a factor of the polynomial, then $f(k) = 0$. Use synthetic division to make sure the other two factors you found for $f(x) = x^3 + 2x^2 - 5x - 6$ in Problem 18 leave a remainder of zero.

20. Test the other two factors of $f(x) = x^3 + 2x^2 - 5x - 6$ to demonstrate that $f(k) = 0$ for both.

Section 6.7 Solving Polynomials Using the Zero Product Property

Practice Problems 6.7

For Problem 1-5, solve the polynomial equation by taking the roots or factoring to find all solutions.

1. $64x^3 - 1 = 0$

2. $1 - 81x^4 = 0$

3. $5x^4 - 20x^2 = 0$

4. $6x^3 = 9x$

5. $32x^3 + 2 = 6$

For Problem 6-10, given the factored form of a polynomial, find the zeroes.

6. $(x - 1)(x + 3)(x - 5) = 0$

7. $(4x^2 - 1)(x + 6) = 0$

8. $(2x + 1)(x - 3) = 0$

9. $(x - 7)(x - 4)(x - 6) = 0$

10. $(2x + 9)(3x - 4)(x + 2) = 0$

For Problem 11-15, multiply the factors of Problem 6-10 to find the polynomial equations and write them in standard form.

11. $(x-1)(x+3)(x-5)=0$

12. $(4x^2-1)(x+6)=0$

13. $(2x+1)(x-3)=0$

14. $(x-7)(x-4)(x-6)=0$

15. $(2x+9)(3x-4)(x+2)=0$

For Problem 16-20, solve the word problem.

16. Use synthetic division to find the zeroes of $f(x)=2x^3+9x^2-6x-5$, given one of the factors is $x+5$.

17. The length of a box is 2 inches longer than the width. The height is double the width. If the volume of the box is 384 $in.^3$ write an equation to represent the volume of the box.

18. If the width of the box in Problem 17 is 6 inches, what is the length, height and volume?

19. Write the cubic equation for the box if the volume is 350 $in.^3$

20. Does the box in Problem 19 have a width of 5 or 9 inches if the volume is 350 in^3?

Section 6.8 The Rational Zero Test

Practice Problems 6.8

For Problem 1, solve each word problem.

1. a) Find all the possible rational zeroes of $x^3 - 6x^2 + 3x + 10 = f(x)$.

b) Use synthetic division to find at least two of the possible rational zeroes that are actual rational zeroes of $f(x)$.

c) Use the actual rational zeroes to write two factors of the polynomial and multiply them.

d) Divide the function $f(x)$ by the product of the two factors to find a third factor of $f(x)$.

e) Write the $f(x)$ in its factored form. What are the three rational zeroes of $f(x)$. Multiply all three factors. Do you get $f(x)$?

For Problem 2, solve each word problem.

2. a) Find all the possible rational zeroes of $x^3 - 3x^2 + 3x - 9 = g(x)$.

b) Use synthetic division to find one possible rational zero that is an actual rational zero of $g(x)$.

c) Divide the polynomial $g(x)$ by the linear factor from the given rational zero to get a quadratic binomial.

d) Solve the quadratic binomial for x. Are these rational, irrational, or complex zeroes?

e) Write $g(x)$ in its factored form. Multiply the factors. Do you get $g(x)$? What are all three zeroes of $g(x)$?

For Problem 3, solve each word problem.

3. a) Find all the possible rational zeroes of $5x^3 + 17x^2 - 10x + 8 = h(x)$.

b) Use synthetic division and the Remainder Theorem to determine if 4 or -4 is an actual rational zero.

c) Divide the polynomial $h(x)$ by the factor from the given rational zero to get another quadratic trinomial.

d) Multiply the linear factor and quadratic trinomial. Do you get $h(x)$?

e) Using the quadratic trinomial and the quadratic formula, find two more zeros.

f) What are the three zeroes of $h(x)$? Are these rational, irrational, or complex zeroes? Write the factored form of $h(x)$.

For Problem 4, tell whether each statement is true or false.

4. a) If k is a zero of a polynomial function f then $(x + k)$ is a factor of $f(x)$.

b) If k is a zero of a polynomial function f then k is a solution of $f(x) = 0$.

c) If k is a zero of a polynomial function f then $r = k$.

d) Complex zeroes of a polynomial function do not appear as *x*-intercepts on the graph of the function.

Section 6.9 Sketching Graphs of Polynomial Functions

Practice Problems 6.9

For Problem 1-15, solve the word problem.

1. Factor the equation below and find the rational zeroes. Does the graph cross through the zeroes at the x-axis or does it bounce at the zero?

$$x^2 - 4x + 4 = 0$$

2. Factor the polynomial $x^3 + 4x = 0$. Are the solutions real or imaginary?

3. Multiply the four solutions of the function below. What is the polynomial equation?

$$(x + 1)(x - 1)(x + i)(x - i) = 0$$

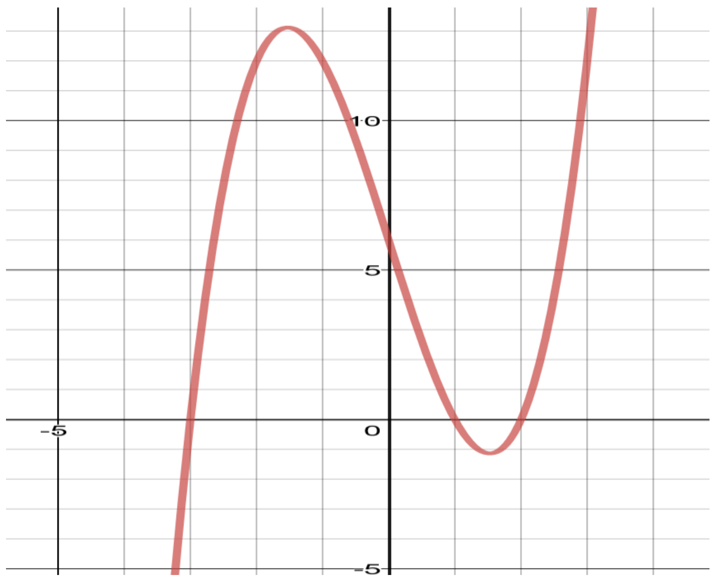
4. A third-degree equation has three solutions. A fifth-degree equation has five solutions. How many solutions does an nth degree equation have?

5. What are the linear factors of $x^3 - x^2 - 2x$?

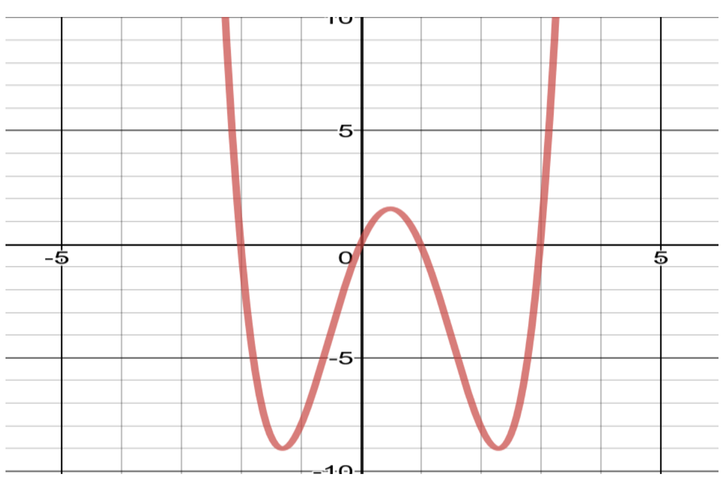
6. A third-degree polynomial equation has the rational zeroes 4, -3 and 1. Write the polynomial function in factored form with a lead coefficient of 1.

7. Multiply the factors of the polynomial in Problem 6 and write the equation in standard form.

8. What are the real number x-intercepts of the polynomial below.



9. What are the x-intercepts of the polynomial below.



10. What is the degree of the polynomial in Problem 8 if all the roots are real?

11. What is the degree of the polynomial in Problem 9 if all the roots are real?

For Problem 12 and 13, solve the multiple-choice problem.

12. What is the end behavior of $h(x) = -8x^2$?

a) As $x \to +\infty$, $h(x) \to +\infty$; as $x \to -\infty$, $h(x) \to -\infty$

b) As $x \to +\infty$, $h(x) \to -\infty$; as $x \to -\infty$, $h(x) \to +\infty$

c) As $x \to -\infty$, $h(x) \to +\infty$; as $x \to +\infty$, $h(x) \to -\infty$

d) As $x \to -\infty$, $h(x) \to -\infty$; as $x \to \infty$, $h(x) \to -\infty$

13. Let $k(x) = -5x^3$. As x becomes very large negative numbers, what happens to $k(x)$?

a) $k(x)$ becomes very large negative numbers.

b) $k(x)$ becomes very large positive numbers.

c) $k(x)$ becomes very small negative numbers.

d) $k(x)$ becomes very small positive numbers.

For Problem 14 and 15, sketch a possible graph for the given end behavior.

14. As $x \to +\infty$, $f(x) \to +\infty$

As $x \to -\infty$, $f(x) \to -\infty$

15. As $x \to +\infty$, $f(x) \to +\infty$

As $x \to -\infty$, $f(x) \to +\infty$

For Problem 16-18, fill in the blanks and sketch the graph.

16. $f(x) = (x + 7)(x + 2)(x - 1)(x - 5)$

x-intercepts: ________________________________

Degree: ____________________________________

Odd or Even: ________________________________

End Behavior: _______________________________

y-intercept: __________________________________

17. $g(x) = -(x + 4)(x - 1)(x - 6)$

x-intercepts: ________________________________

Degree: ____________________________________

Odd or Even: ________________________________

End Behavior: _______________________________

y-intercept: __________________________________

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

x-intercepts: ________________________________

Degree: ____________________________________

Odd or Even: ________________________________

End Behavior: _______________________________

y-intercept: __________________________________

19. A polynomial function has the equation $y = ax(x-4)^2(x+2)$ and goes through the point $(5, -35)$. Find the value of a and write the equation in standard form.

20. Michaela thought the equation $y = 3(x+1)^4(x-4)$ is a polynomial that would work for the graph that bounces off the x-axis at $(-1, 0)$, crosses it at $(4, 0)$, and goes through the point $(-2, -18)$. Does this work or not? Explain why or why not. Show your work using equations graphs and tables.

Section 6.10 End Behavior and Multiplicities

Practice Problems 6.10

For Problem 1-5, name the degree of each polynomial and tell the multiplicity of the zeroes.

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

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

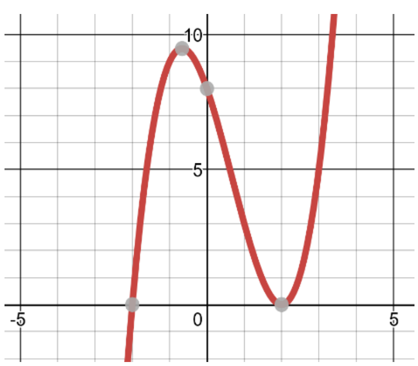
3. $f(x) = (x-5)(x+5)^4$

4. $f(x) = (x-1)(x+2)(x+3)$

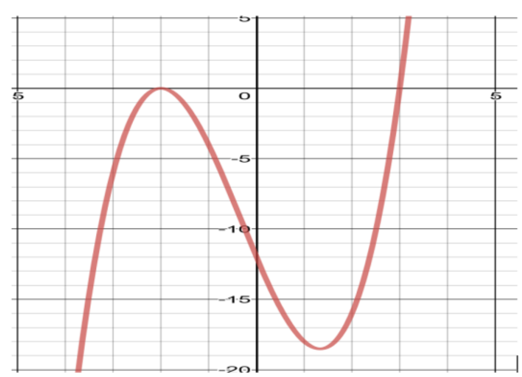
5. $f(x) = (x-1)(x+2)^2(x+3)^3$

For Problem 6-9, fill in the degree for each graph. Use a 1 or 2 for Problem 6-8 and a 2 or a 3 for Problem 9.

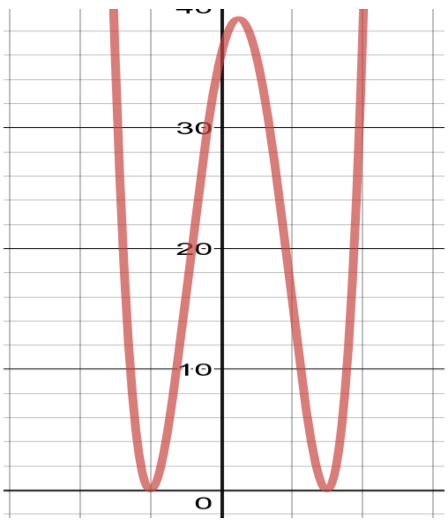
6. $f(x) = (x+2)^{--}(x-2)^{--}$



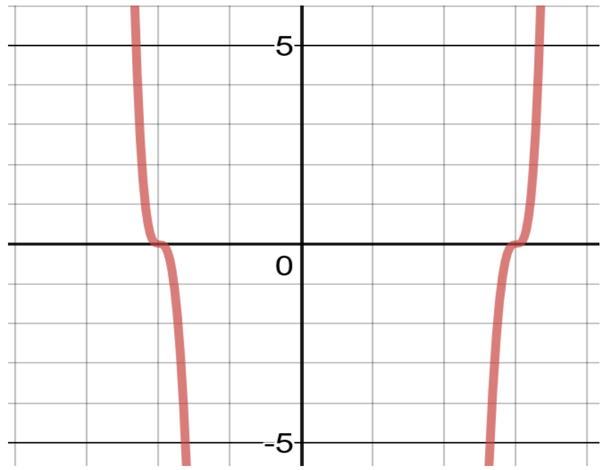
7. $f(x) = (x+2)^{--}(x-3)^{--}$



8. $f(x) = (x+2)^{--}(x-3)^{--}$



9. $f(x) = (x+2)^{--}(x-3)^{--}$



For Problem 10-20, solve the word problem or fill in the blanks.

10. What is the degree of the polynomial in Problem 6? Why does it start down and end up?

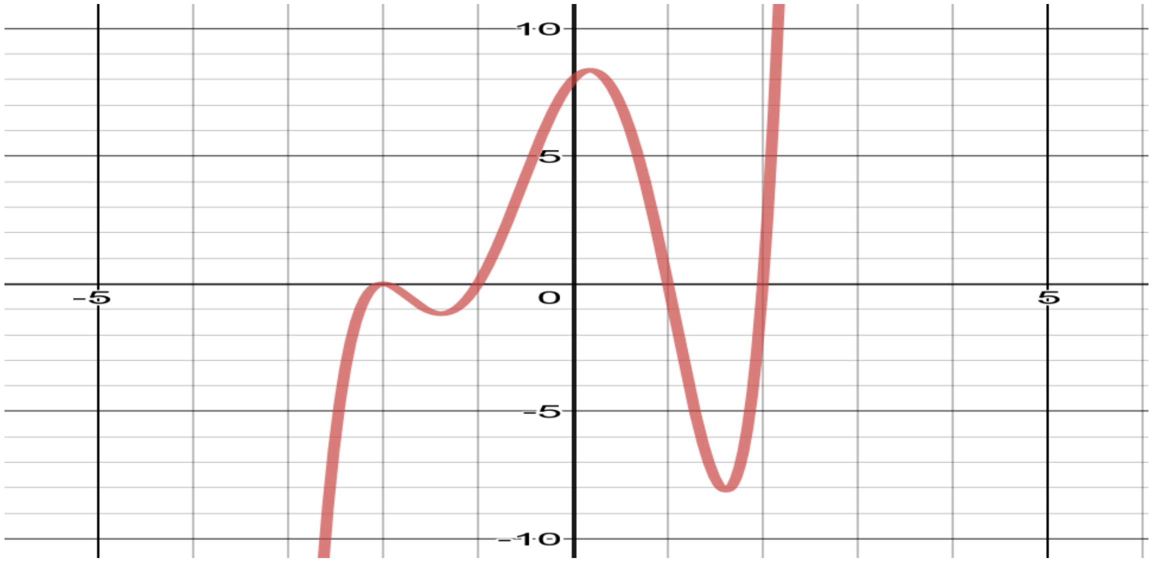
11. Why does the polynomial in Problem 7 start and end the same way as Problem 6?

12. The graph in Problem 8 starts up and ends up. What does this tell you about the degree of the polynomial?

13. The degree of the polynomial graph in Problem 9 is even and *a* > 0 so it starts ______________ and ends up. The multiplicities are odd so the graph ___________________ through the zeroes rather than bounces.

14. What are the zeroes of the polynomials in Problem 6-9?

For Problem 15-20, use the graph below to answer the problem.



15. How many zeroes does the polynomial have assuming all are real solutions?

16. What are the zeroes of the polynomial?

17. Write the zeroes as factors, include multiplicities.

18. Why does the graph start down and end up?

19. What does the end behavior tell you about the sign of "a"?

20. What is the y-intercept of the graph? Assume $a = 1$.

Section 6.11 Curves and Bounces of Graphs

Practice Problems 6.11

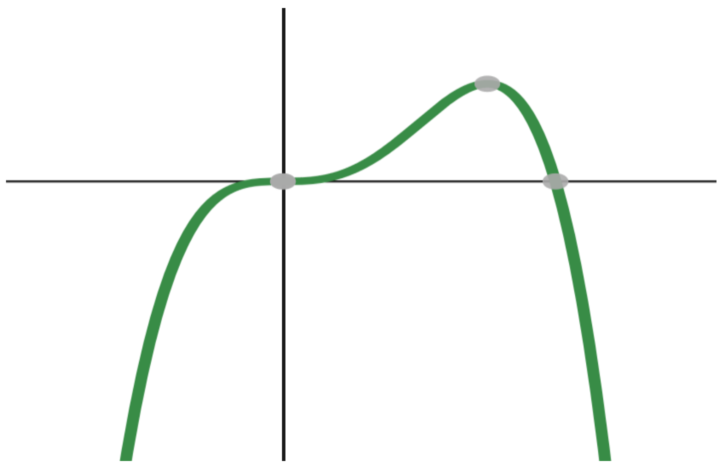
For Problem 1-6, given the degree, tell the maximum number of bounces a polynomial graph could have.

1. degree 4
2. degree 13
3. degree 1
4. degree 5
5. degree 9
6. degree 2

For Problem 7-11, given the number of bounces of a polynomial equation, tell the minimum nth degree of the equation.

6. 4 bounces
7. 10 bounces
8. 2 bounces
9. 1 bounce
10. 0 bounces
11. 16 bounces

Use the graph below for Problem 12-17.



12. Is this an even or odd function?

13. What is the minimum number of real zeroes of the polynomial?

14. What does the flattening at the origin indicate?

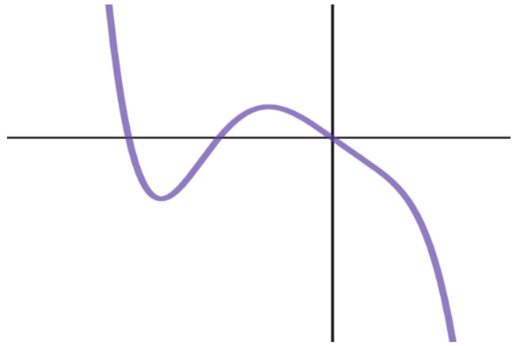
15. Based on the number of bounces, what is the minimum degree of the polynomial?

16. What is the multiplicity of the zero that is not at the origin?

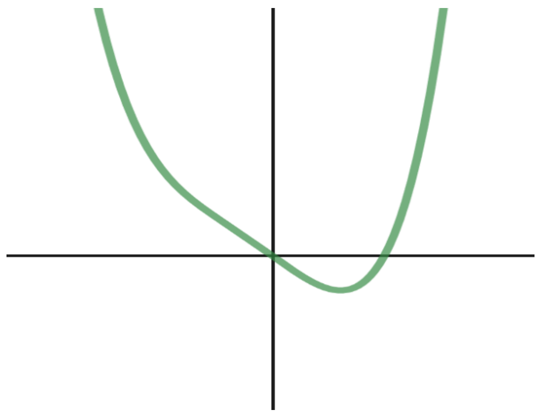
17. If this is a fourth-degree polynomial, and all solutions are real, what the multiplicity at the origin?

For Problem 18-20, give as much information as possible for each polynomial.

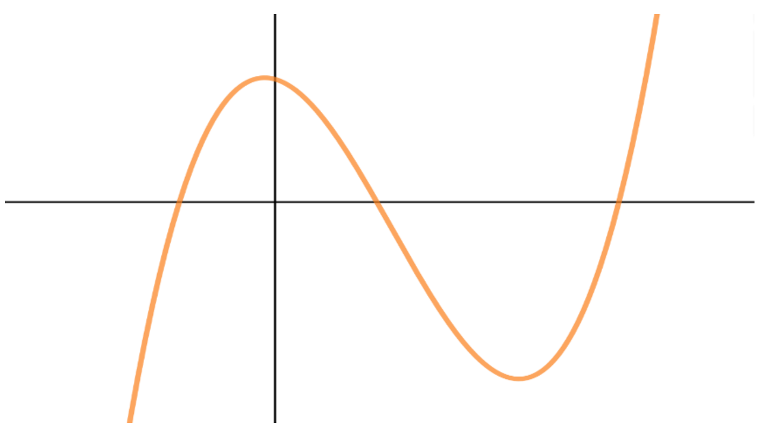
18.



19.



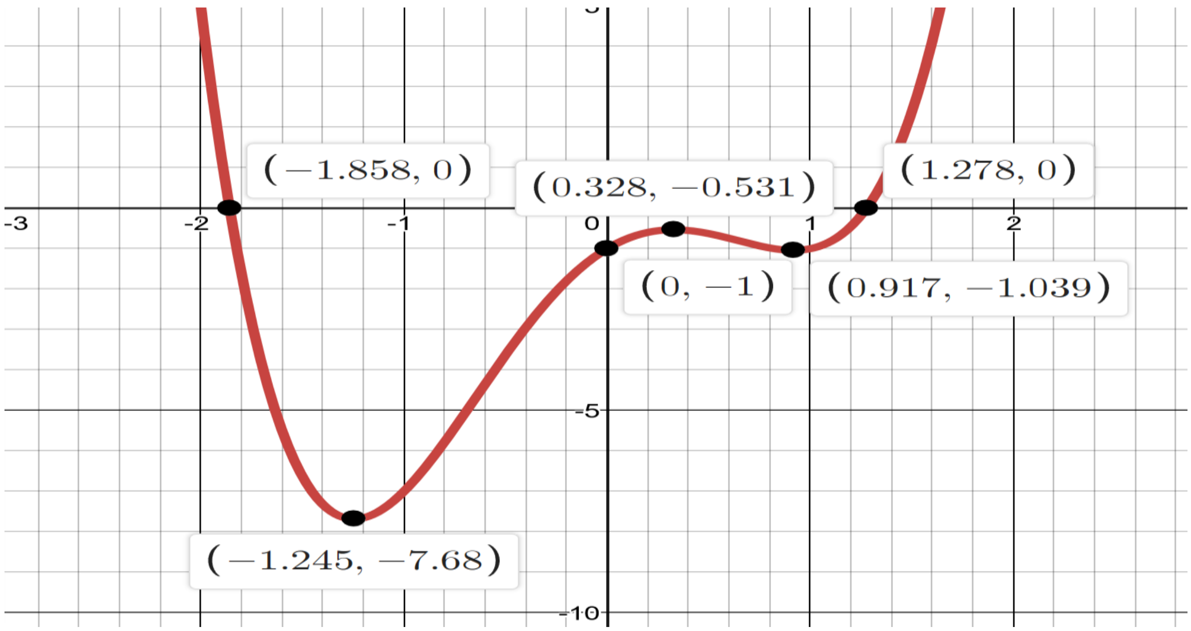
20.



Section 6.12 Concavity, Intervals and Extrema

Practice Problems 6.12

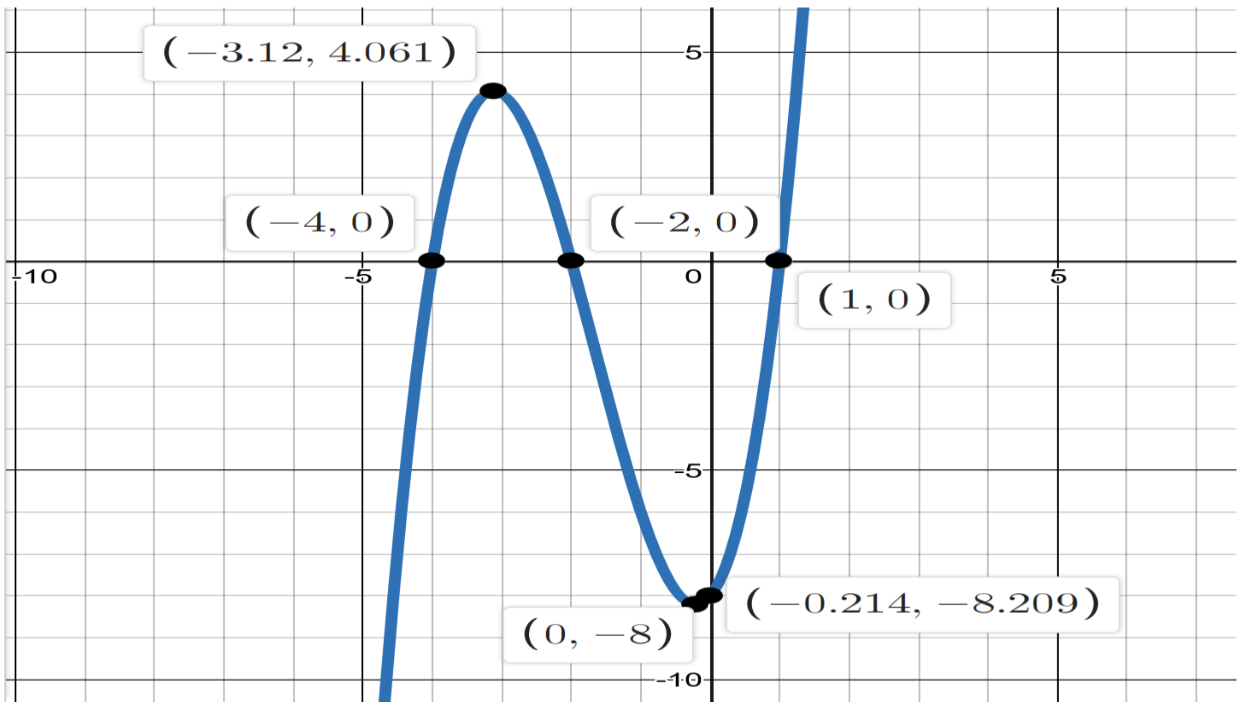
For Problem 1-10, use the polynomial graphing to complete the table and answer the questions.



1. x-intercept	
2. y-intercept	
3. End Behavior	
4. Increasing Interval	
5. Decreasing Interval	
6. Domain	
7. Range	
8. Local and Global Minimum	
9. Local and Global Maximum	

10. How many bounces does the polynomial have? What is the minimum degree of the polynomial?

For Problem 11-20, use the polynomial graphing to complete the table and answer the questions.



11. x-intercept	
12. y-intercept	
13. End Behavior	
14. Increasing Interval	
15. Decreasing Interval	
16. Domain	
17. Range	
18. Local and Global Minimum	
19. Local and Global Maximum	

20. How many bounces does the polynomial have? What is the minimum degree of the polynomial?

Section 6.13 Writing Polynomial Equations

Practice Problems 6.13

For Problem 1-5, given the function $y = ax^3 + 2x^2 - 1$, solve the problem.

1. If $a = -2$, does the graph start up or down?

2. If $a = -2$, is $(1, -2)$ a point on the graph?

3. If $a = -2$ and the graph passes through the point $x = 1$, is this a zero of the function or not?

4. Name one ordered pair on the function if $a = -2$ and $x = 3$.

5. Find "a" if $(1, 5)$ is a point on the graph.

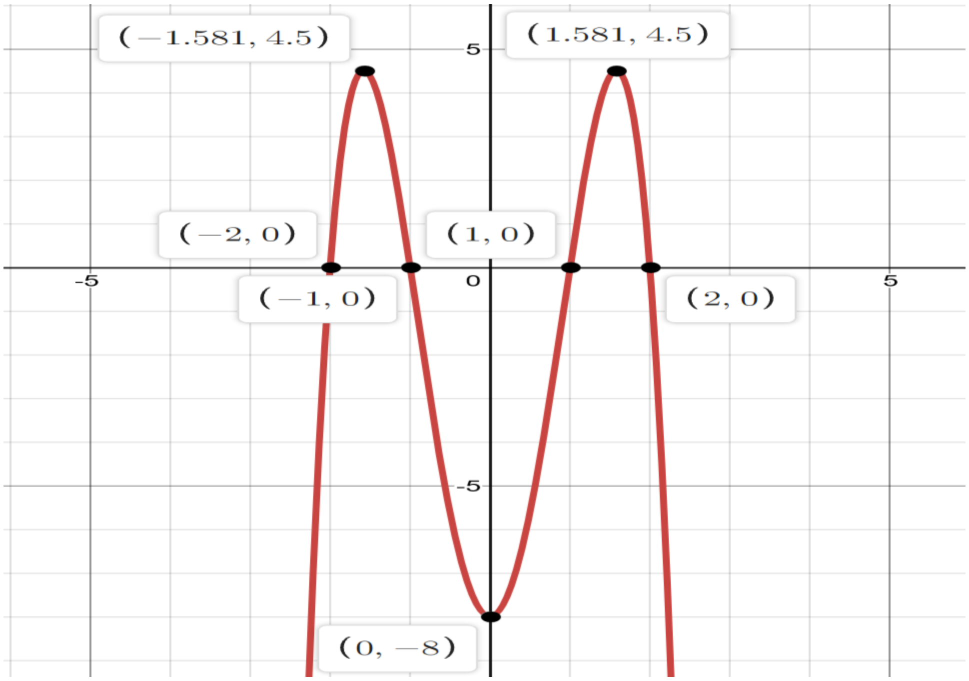
For Problem 6-8, given the graphing form $y = a(x - 1)^3 + 4$, solve the problem.

6. Find "a" if $(3, 28)$ is a point on the graph.

7. Find "a" if $(5, \frac{1}{16})$ is a point on the graph.

8. Find "a" if $(0, 0)$ is a point on the graph.

For Problem 9-20, use the graph below to answer the problems.



9. How many bounces are there?

10. How many zeroes are there?

11. Name the zeroes.

12. Is it odd or even?

13. Describe the end behavior.

14. What are the local maxima over [-2, 2]?

15. What is the local minimum over [-2, 2]?

16. What is the domain?

17. What is the range?

18. What is the minimum degree?

19. Given the zeroes and the y-intercept, find "a."

20. Write the equation in standard form.

Section 6.14 Module Review

For Problem 1-5, use the polynomial $f(x) = 9a^2 + 5a^6 - 8a - 3$ to answer the problem.

1. What is the degree of the polynomial?

2. What is the linear term?

3. What is the constant term?

4. What is the lead coefficient?

5. What is the polynomial in standard form?

For Problem 6, combine the like terms to simplify the expression.

6. $-6k^4 - 8k^2 + 3 + 6k - 8k^4 - 5k^2 + 2 - 2k^5 - 4 + 5k + 2k^2 - 7k^5$

For Problem 7-9, factor the polynomial.

7. $48x^2y - 16xy^2 + 12xy$

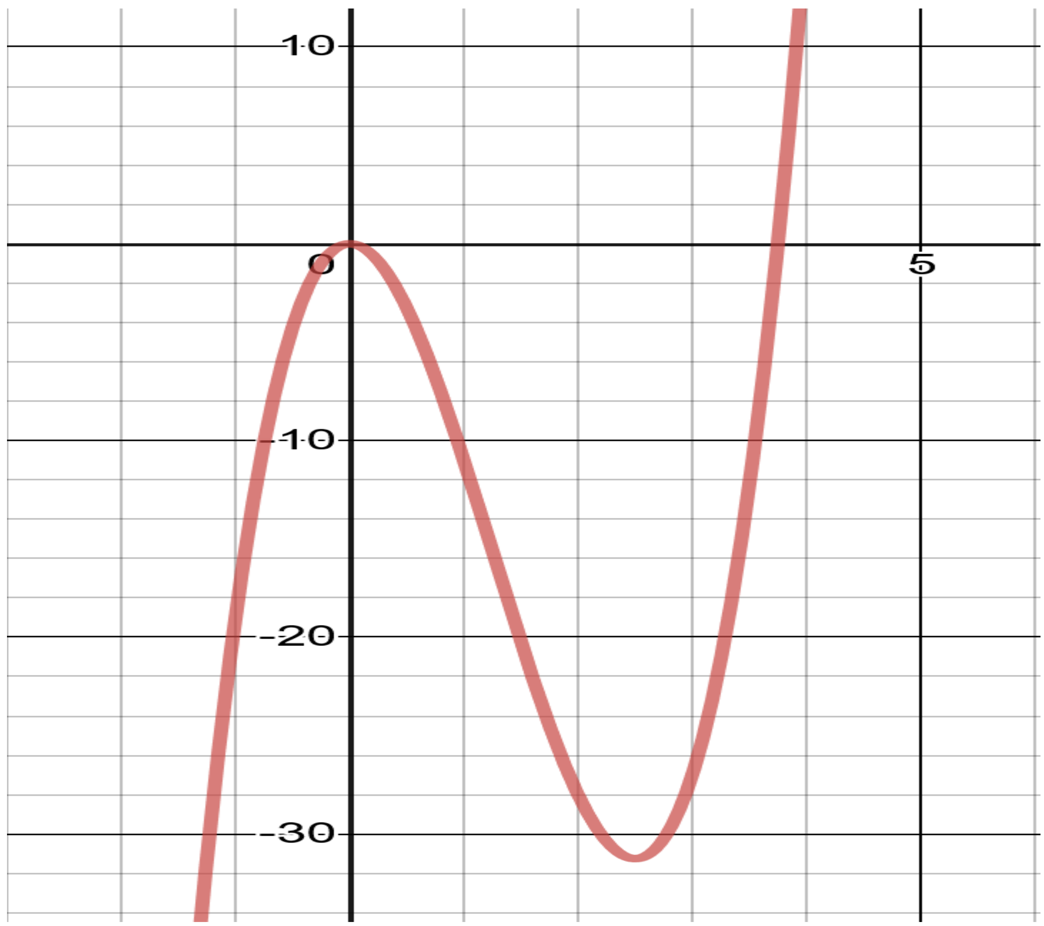
8. $g(x) = x^2 + 12x + 32$

9. $h(x) = 25x^2 - 1$

For Problem 10, divide using synthetic division.

10. $\frac{x^3+x^2-2x+12}{x+3}$

For Problem 11-20, use the graph to fill in the table and answer the questions.



11. Number of Rational Zeroes	
12. Odd or Even	
13. Number of Bounces	
14. Minimum Degree	
15. Is there a global/absolute Maximum or Global/Absolute Minimum?	
16. Is "a" Positive or Negative?	
17. One zero is $(3.75, 0)$. Name the other zero.	
18. Multiplicity of each zero	
19. Find "a" if $(3, -27)$ is another point on the graph.	
20. Write the equation in standard form.	

Section 6.15 Module Test

For Problem 1-5, use the polynomial $f(x) = -7x^5r^3 - 8x^6$ to answer the questions.

1. What is the degree of the polynomial?

2. What is the lead coefficient?

3. What is the constant term?

4. How many monomial terms does the polynomial have?

5. What is the name of the polynomial by the number of terms?

For Problem 6, combine like terms to simplify the polynomial.

6. $-3k^2 + 5k^3 - 6k^5 + 2k - 5k - 3k^5 - 3k^3 - 3k^2 - 7k^4 + 4k^5 - k^3 + 2$

For Problem 7-9, factor the polynomial.

7. $3x^2 - 12xy + 15x^2y$

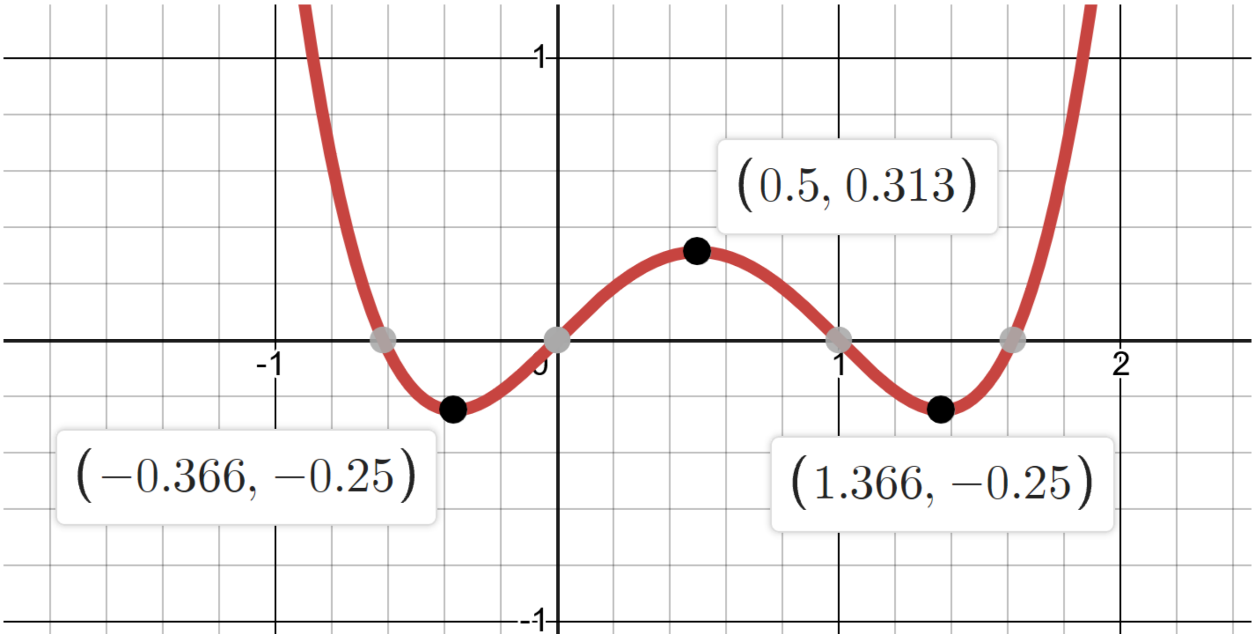
8. $g(x) = 25 - 10x + x^2$

9. $h(x) = 6x^2 + x - 7$

For Problem 10, divide using synthetic division.

10. $\frac{2x^3-7x^2+11x-10}{x-2}$

For Problem 11-20, use the graph to fill in the table and answer the questions.



11. Number of Rational Zeroes	
12. Odd or Even	
13. Number of Bounces	
14. Minimum Degree	
15. Is there a global/absolute or local/relative maximum? Is there a global/absolute or local/relative minimum? Where do these occur?	
16. Is "a" Positive or Negative?	
17. y-intercept	
18. Increasing Interval	
19. Decreasing Interval	
20. The equation is $f(x) = x^4 - 2x^3 + x$. Find $f(2.1)$.	