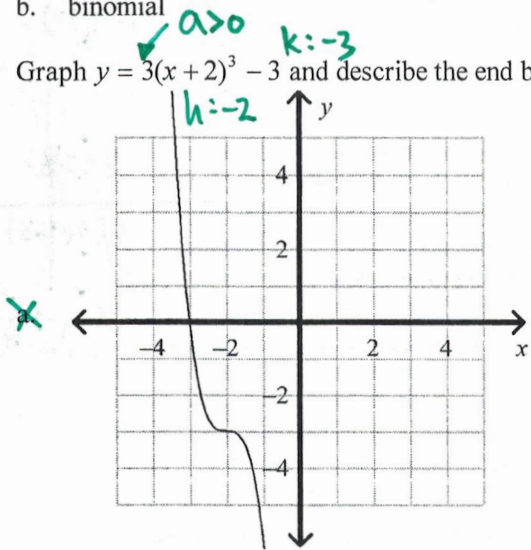
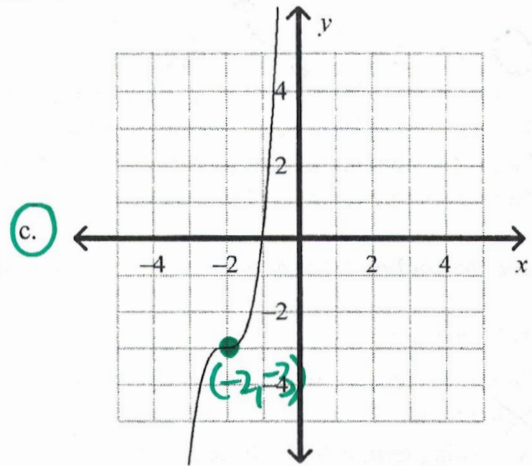


Alg 2 Topic 3 Practice

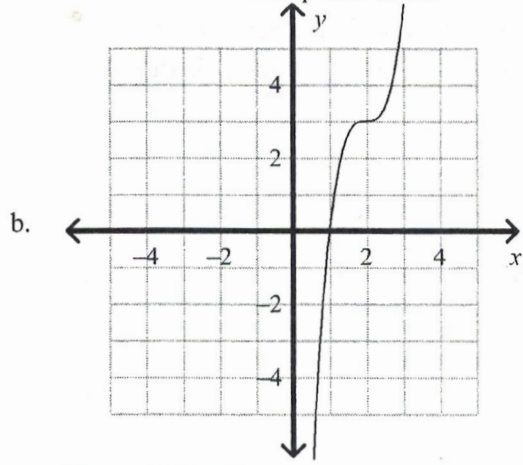
- A 1. Classify $-2x^4 - x^3 + 8x^2 + 12$ by degree.
- a. quartic
 - b. quintic
 - c. quadratic
 - d. cubic
- D 2. Classify $8x^4 + 7x^3 + 5x^2 + 8$ by number of terms.
- a. trinomial
 - b. binomial
 - c. polynomial of 5 terms
 - d. polynomial of 4 terms
- C 3. Graph $y = 3(x+2)^3 - 3$ and describe the end behavior.



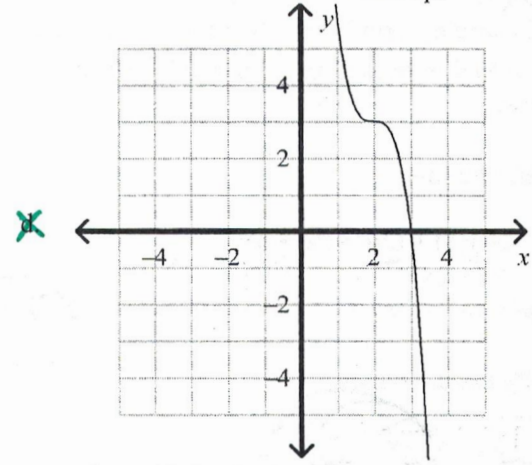
The end behavior is up and down.



The end behavior is down and up.



The end behavior is down and up.



The end behavior is up and down.

Write the polynomial in standard form. Then name the polynomial based on its degree and number of terms.

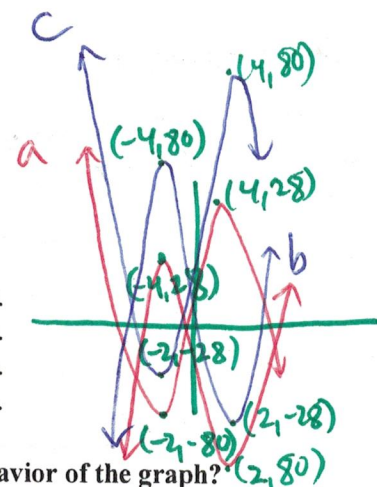
C 4. $4g - 5g^3 + 9g^2 - 6$

- a. $5g^3 - 9g^2 + 4g - 6$; cubic trinomial
- b. $9g^3 - 5g^2 + 4g - 6$; quadratic binomial
- c. $-5g^3 + 9g^2 + 4g - 6$; cubic polynomial
- d. $-6 + 4g + 9g^2 - 5g^3$; cubic binomial

What is the relative maximum and minimum of the function?

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

- narrow down choices*
- ~~a.~~ The relative maximum is at $(4, 28)$ and the relative minimum is at $(-2, -80)$.
 - b. The relative maximum is at $(-4, 80)$ and the relative minimum is at $(2, -28)$.
 - ~~c.~~ The relative maximum is at $(4, 80)$ and the relative minimum is at $(-2, -28)$.
 - d. The relative maximum is at $(-4, 28)$ and the relative minimum is at $(2, -80)$.



Consider the leading term of each polynomial function. What is the end behavior of the graph?

C 6. $5x^8 - 2x^7 - 8x^6 + 1$

- ~~a.~~ The leading term is $5x^8$. Since n is even and a is positive, the end behavior is down and up.
- ~~b.~~ The leading term is $5x^8$. Since n is even and a is positive, the end behavior is up and down.
- c. The leading term is $5x^8$. Since n is even and a is positive, the end behavior is up and up.
- d. The leading term is $5x^8$. Since n is even and a is positive, the end behavior is down and down.

Simplify the sum.

D 7. $(2u^3 + 6u^2 + 3) + (2u^3 - 7u + 6)$

- a. $9 - 7u + 6u^2 + 4u^3$
- b. $0u^3 + 6u^2 - 7u + 9$
- c. $0u^3 - 7u^2 + 6u - 9$
- d. $4u^3 + 6u^2 - 7u + 9$

Simplify the difference.

A 8. $(4w^2 - 7w - 6) - (8w^2 + 2w - 3)$

- a. $-4w^2 - 9w - 3$
- b. $12w^2 + 9w + 3$
- c. $-4w^2 - 5w - 9$
- d. $12w^2 - 5w - 9$

Simplify the product.

D

9. $8p(-3p^2 + 6p - 2)$

- a. $-5p^3 + 14p^2 - 6p$
- b. $48p^2 - 16p - 24p^3$

- c. $14p^2 - 6p - 5p^3$
- d. $-24p^3 + 48p^2 - 16p$

Multiply the polynomials.

D

10. $(3x - 7)(3x - 5)$

- a. $9x^2 + 6x + 35$
- b. $9x^2 + 36x + 35$

- c. $9x^2 - 36x - 35$
- d. $9x^2 - 36x + 35$

Factor the polynomial.

B

11. $25w^6 + 35w^3$

- a. $5w^2(5w^4 + 7w)$
- b. $5w^3(5w^3 + 7)$
= GCF

- c. $w^3(25w^3 + 35)$
- d. $5(5w^6 + 7w^3)$

Use polynomial identities to multiply the expressions.

A

12. $(2x - 6)^2$

- a. $4x^2 - 24x + 36$
- b. $4x^2 - 8x + 36$

$(2x - 6)(2x - 6)$

- c. $4x^2 + 36$
- d. $4x^2 - 12x + 36$

What is a simpler form of the following expressions?

A

13. $(7m^2 - 5)(7m^2 + 5)$

- a. $49m^4 - 25$
- b. $49m^3 - 25$

prod sum & diff.
~~FOIL~~

- c. $49m^2 - 25$
- d. $49m^4 + 25$

Use the Binomial Theorem to expand the binomial.

D

14. $(d - 3b)^3$

- a. $d^3 - 3d^2b + 3db^2 - b^3$
- b. $d^3 + 3d^2b + 3db^2 + b^3$
- c. $d^3 + 9d^2b + 27db^2 + 27b^3$
- d. $d^3 - 9d^2b + 27db^2 - 27b^3$

$d^3 - 9bd^2 + 27b^2d - 27b^3$

1	1
3	3
3	3
1	1

Use Pascal's Triangle to expand the binomial.

A

15. $(2v + s)^5$

- a. $s^5 + 10s^4v + 40s^3v^2 + 80s^2v^3 + 80sv^4 + 32v^5$
- b. $s^5 + 20s^4v + 80s^3v^2 + 160s^2v^3 + 160sv^4 + 64v^5$
- c. $s^5 - 5s^4v + 10s^3v^2 - 10s^2v^3 + 5sv^4 - v^5$
- d. $s^5 + 10s^4 + 40s^3 + 80s^2 + 80s + 32$

$s^5 + 10s^4v$

1	5	10	10	5	1
	5	10	10	5	
		10	10	5	
			10	5	
				5	
					1

Name: _____

ID: X

$(x-a)$ $a: -4$
or Synthetic \div

C 16. Divide $4x^3 + 2x^2 + 3x + 4$ by $x + 4$ using long division.

- a. $4x^2 - 14x + 59$
- b. $4x^2 + 18x - 53$, R 240
- c. $4x^2 - 14x + 59$, R -232
- d. $4x^2 + 18x - 53$

$$\begin{array}{r} -4 \\ 4 \overline{) 4 2 3 4} \\ \underline{-16 56 -236} \\ 4 -14 59 -232 \end{array}$$

Divide using synthetic division.

A 17. Divide $-4x^3 + 21x^2 - 23x + 6$ by $(x - 4)$. $a: 4$

- a. $-4x^2 + 5x - 3$, R -6
- b. $4x^2 - 5x + 3$
- c. $-4x^2 + 37x - 43$, R 18
- d. $4x^2 - 37x + 43$

$$\begin{array}{r} 4 \\ 4 \overline{) -4 21 -23 6} \\ \underline{-16 20 -12} \\ -4 5 -3 -6 \end{array}$$

C 18. Use synthetic division to find $P(-2)$ for $P(x) = x^4 + 9x^3 - 9x + 2$.

- a. -2
- b. 0
- c. -36
- d. 68

$$\begin{array}{r} -2 \\ 1 \overline{) 1 9 0 -9 2} \\ \underline{-2 -17 28 -38} \\ 1 7 -17 19 -36 \end{array}$$

What are all the real and complex solutions of the polynomial equation?

B 19. $x^3 - 8 = 0$

GC: possible roots: 2

- a. $1 + i\sqrt{3}$ and $1 - i\sqrt{3}$
- b. $2, -1 + i\sqrt{3}$, and $-1 - i\sqrt{3}$
- c. $2, 1 + 2i\sqrt{3}$, and $1 - 2i\sqrt{3}$
- d. $2, 2 + 2i\sqrt{3}$, and $2 - 2i\sqrt{3}$

$$\begin{array}{r} 2 \\ 2 \overline{) 1 0 0 -8} \\ \underline{2 4 8} \\ 1 2 4 0 \end{array}$$

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

What are the zeros of the function? What are their multiplicities?

B 20. $f(x) = x^4 - 4x^3 + 3x^2$

- a. the numbers -1 and -3 are zeros of multiplicity 2; the number 0 is a zero of multiplicity 1
- b. the number 0 is a zero of multiplicity 2; the numbers 1 and 3 are zeros of multiplicity 1
- c. the numbers 0 and 1 are zeros of multiplicity 2; the number 3 is a zero of multiplicity 1
- d. the number 0 is a zero of multiplicity 2; the numbers -1 and -3 are zeros of multiplicity 1

$$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(4)}}{2(1)}$$

$$\begin{aligned} &= \frac{-2 \pm \sqrt{4-16}}{2} \\ &= \frac{-2 \pm \sqrt{-12}}{2} \\ &= \frac{-2 \pm 2i\sqrt{3}}{2} \\ &= -1 \pm i\sqrt{3} \end{aligned}$$

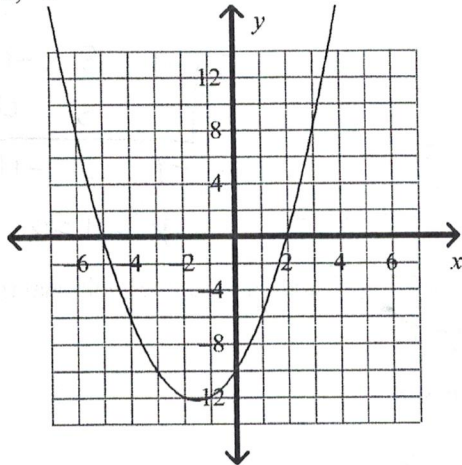
$$x^2(x^2 - 4x + 3)$$

$$x^2(x-3)(x-1) = 0$$

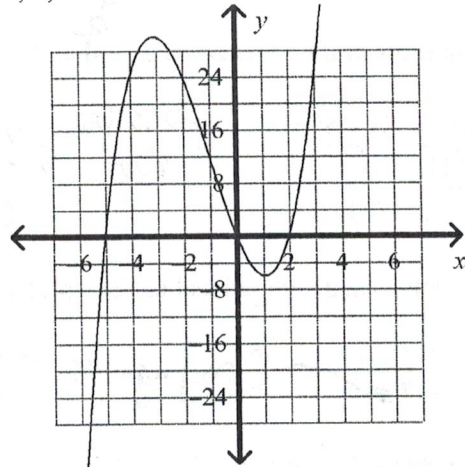
Multiplicity $\left(\begin{array}{l} x=0 \\ x=0 \end{array} \right) \left| \begin{array}{l} x=3 \\ x=1 \end{array} \right.$

What are the zeros of the function? Graph the function.

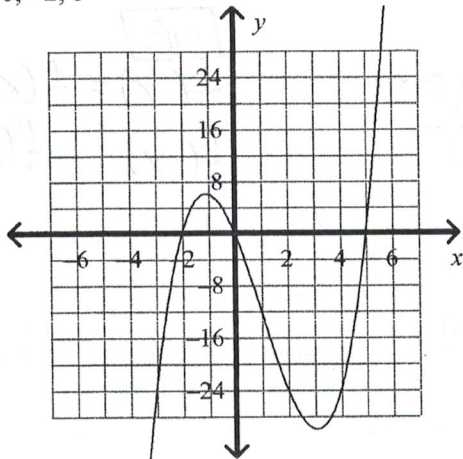
C 21. $y = x(x-2)(x+5)$
 a. 2, -5



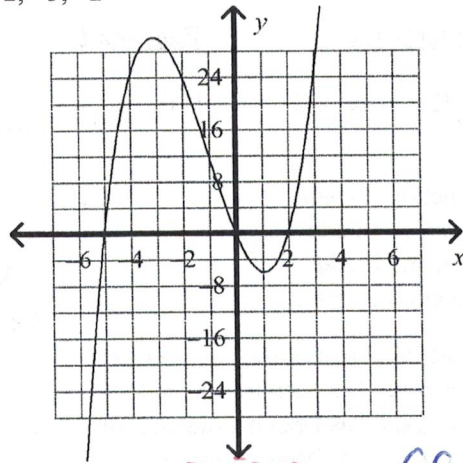
C c. 0, 2, -5



b. 0, -2, 5



d. 2, -5, -2



B

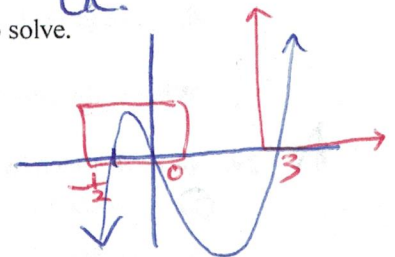
22. What values of x are solutions to the inequality $4x^3 - 10x^2 - 6x > 0$? Use a graph to solve.

a. $-\frac{1}{2} < x$ and $x > 3$

c. $x > \frac{1}{2}$ and $-3 < x < 0$

B b. $-\frac{1}{2} < x < 0$ and $x > 3$

d. $x < -\frac{1}{2}$ and $0 < x < 3$



Find all the zeros of the equation.

D

23. $-x^3 + x^2 - 3x + 3 = 0$

a. $\sqrt{3}, -\sqrt{3}, 1$

c. $i\sqrt{3}, -i\sqrt{3}, -1$

b. $i\sqrt{3}, -1$

D d. $i\sqrt{3}, -i\sqrt{3}, 1$

GC: Roots? 1

$$\begin{array}{r|rrrr} 1 & -1 & 1 & -3 & 3 \\ & & -1 & 0 & -3 \\ \hline & -1 & 0 & -3 & 0 \end{array}$$

$-x^2 - 3 = 0$
 $-x^2 = 3$
 $x^2 = -3$
 $x = \pm\sqrt{-3}$
 $x = \pm i\sqrt{3}$

- B 24. Use the Rational Root Theorem to list all possible rational roots of the polynomial equation $x^3 - 4x^2 + 7x - 8 = 0$. Do not find the actual roots.
- a. -8, -1, 1, 8
 b. -8, -4, -2, -1, 1, 2, 4, 8
 c. 1, 2, 4, 8
 d. no possible roots

Find the roots of the polynomial equation.

- D 25. $-x^3 + 5x^2 - 11x + 55 = 0$
- a. $i\sqrt{11}, -i\sqrt{11}, -5$
 b. $\sqrt{11}, -\sqrt{11}, 5$
 c. $i\sqrt{11}, -5$
 d. $i\sqrt{11}, -i\sqrt{11}, 5$

Handwritten work for Q25:

$$5 \begin{array}{r|rrrr} -1 & 5 & -11 & 55 \\ & -5 & 0 & -55 \\ \hline & -1 & 0 & -11 & 0 \end{array}$$

$-x^2 - 11 = 0 \rightarrow x^2 = -11 \rightarrow x = \pm\sqrt{-11} = \pm i\sqrt{11}$

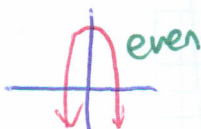
- B 26. A cubic polynomial with rational coefficients has the roots $2 + \sqrt{7}$ and $\frac{3}{8}$. Find one additional root.
- a. $2 + \sqrt{7}$
 b. $2 - \sqrt{7}$
 c. $7 - \sqrt{2}$
 d. $7 + \sqrt{2}$

Conjugates

- D 27. Are the polynomial functions given below even, odd, or neither?

GC **Function I**
 $f(x) = 12x^5 - 4x^2 + 3$
 neither

Function II
 $f(x) = -x^6 + 3$



OR
 $f(-x) = f(x) \leftarrow$ even
 $f(-x) = -f(x) \leftarrow$ odd

- a. Function I: neither
 Function II: odd
 b. Function I: odd
 Function II: even
 c. Function I: even
 Function II: odd
 d. Function I: neither
 Function II: even

- C 28. How does the graph of the function $f(x) = (x - 15)^3 + 4$ differ from the graph of its parent cubic function?
- a. The graph has been translated left 4 units and down 15 units.
 b. The graph has been translated right 4 units and down 15 units.
 c. The graph has been translated right 15 units and up 4 units.
 d. The graph has been translated left 15 units and up 4 units.

What is the equation of $y = x^3$ with the given transformations?

- B 29. vertical stretch by a factor of 8, horizontal shift 2 units to the right, vertical shift 7 units down
- a. $y = 8(x + 2)^3 - 7$
 b. $y = 8(x - 2)^3 - 7$
 c. $y = 8(x - 2)^3 + 7$
 d. $y = \frac{1}{8}(x - 2)^3 - 7$

- C 30. What are all the real zeros of $y = (x - 12)^3 - 10$?
- a. $x = \sqrt[3]{10 + 12}$
 b. $x = \sqrt[3]{-10} + 12$
 c. $x = \sqrt[3]{10} + 12$
 d. $x = \sqrt[3]{12} - 10$

Handwritten work for Q30:

$$y + 10 = (x - 12)^3$$

$$\sqrt[3]{y + 10} = x - 12$$

$$\sqrt[3]{y + 10} + 12 = x$$

Set $y = 0 \rightarrow \sqrt[3]{10} + 12 = x$