

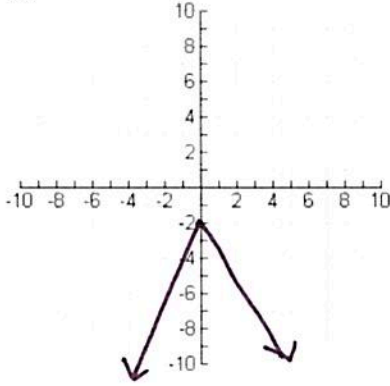
PAP Algebra 2
Semester Quiz Review

Name: Mrs. G.

$y = |x|$

Given the equation of the absolute value function, graph and identify the following attributes.

1. $f(x) = -|x| - 2$



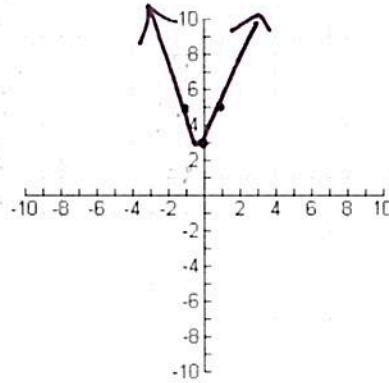
Transformations:
Vertical Reflection
down 2

Vertex:

$(0, -2)$

Range: $(-\infty, -2]$
 $y \leq -2$

2. $f(x) = 2|-x| + 3$



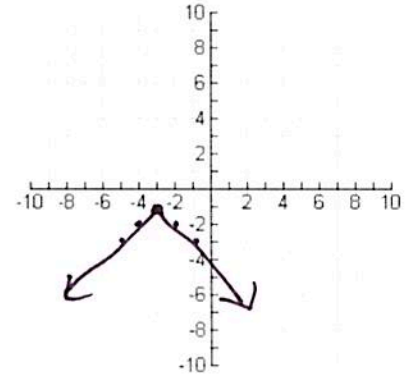
Transformations:
Vertical Stretch
Horizontal Reflection
up 3

Vertex:

$(0, 3)$

Range: $[3, \infty)$
 $y \geq 3$

3. $f(x) = -|x+3| - 1$



Transformations:
Vertical reflection
Left 3
down 1

Vertex:

$(-3, -1)$

Range: $(-\infty, -1]$
 $y \leq -1$

Solve the following absolute value equations. Be sure to check for extraneous solutions, if applicable. * isolate | | first. then set equal to positive value & negative value

4. $|5 - 6x| + 3 = 10$

$|5 - 6x| = 7$

$5 - 6x = 7$

$-6x = 2$

$x = -1/3$

$5 - 6x = -7$

$-6x = -12$

$x = 2$

5. $|2x + 6| = 24$

$|2x + 6| = 12$

$2x + 6 = 12$

$2x = 6$

$x = 3$

$2x + 6 = -12$

$2x = -18$

$x = -9$

6. $2|3x - 3| - 2 = 14$

$2|3x - 3| = 16$

$|3x - 3| = 8$

$3x - 3 = 8$

$3x = 11$

$x = 11/3$

$3x - 3 = -8$

$3x = -5$

$x = -5/3$

7. Given a table for $f(x)$. Complete a table for $h(x)$ given $h(x) = 2(x - 2) + 4$

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

add 2 mult. by 2
add 4

x	h(x)
-1	4
1	-2
2	6
3	4
4	6
5	4

8. For one day, the movie theater decided to roll back the prices to celebrate its grand opening.

Children: \$2

Adults: \$4

Senior Citizens: \$3

By the end of the day, the movie theater had sold 110 tickets and collected \$344 from ticket sales. On this day, the number of adult tickets sold was equal to the number of children tickets and senior citizen tickets combined.

Calculate the number of children, adult, and senior citizen tickets were sold. Be sure to define your variables, formulate a system of equations, and use matrices to solve the system.

$$2C + 4A + 3S = 344$$

$$C + A + S = 110$$

$$A = C + S$$

$$2C + 4A + 3S = 344$$

$$C + A + S = 110$$

$$C - A + S = 0$$

$$\begin{bmatrix} 2 & 4 & 3 \\ 1 & 1 & 1 \\ 1 & -1 & 1 \end{bmatrix}^{-1} \begin{bmatrix} 344 \\ 110 \\ 0 \end{bmatrix}$$

41 children

55 adult

14 senior citizens

For #9-10, solve each system of two equations in two variables by hand using substitution.

$$\begin{cases} y = x^2 + x - 8 \\ x + y = 7 \end{cases} \quad (-5, 12) \\ y = 7 - x \quad (3, 4)$$

$$7 - x = x^2 + x - 8$$

$$0 = x^2 + 2x - 15$$

$$0 = (x + 5)(x - 3)$$

$$x = -5 \quad x = 3$$

$$y = 7 + 5 \quad y = 7 - 3$$

$$y = 12 \quad y = 4$$

$$10. \begin{cases} y = x^2 - 6x \\ -6x + y = -32 \end{cases} \quad (4, -8) \\ y = -32 + 6x \quad (8, 16)$$

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

$$0 = x^2 - 12x + 32$$

$$0 = (x - 4)(x - 8)$$

$$x = 4 \quad x = 8$$

$$y = 4^2 - 6(4) \quad y = 8^2 - 6(8)$$

$$y = -8 \quad y = 16$$

Solve the following systems using a calculator (matrices). Make sure to setup your matrix correctly.

$$11. \begin{cases} -2x + y + 3z = -8 \\ 3x + 4y - 2z = 9 \\ x + 2y + z = 4 \end{cases}$$

$$\begin{bmatrix} -2 & 1 & 3 \\ 3 & 4 & -2 \\ 1 & 2 & 1 \end{bmatrix}^{-1} \begin{bmatrix} -8 \\ 9 \\ 4 \end{bmatrix}$$

$$x = 5 \quad y = -1 \quad z = 1$$

$$12. \begin{cases} 5y - z = 16 - x \\ 3x - 3y = 12 - 2z \\ 2x + z - 20 = -4y \end{cases}$$

$$\begin{cases} x + 5y - z = 16 \\ 3x - 3y + 2z = 12 \\ 2x + 4y + z = 20 \end{cases}$$

$$\begin{bmatrix} 1 & 5 & -1 \\ 3 & -3 & 2 \\ 2 & 4 & 1 \end{bmatrix}^{-1} \begin{bmatrix} 16 \\ 12 \\ 20 \end{bmatrix}$$

$$x = 6 \quad y = 2 \quad z = 0$$

$$13. \begin{cases} 5y - z = -11 - 9x \\ 6x + 2z = 2 - 4y \\ 2x = 4 - 4z + 2y \end{cases}$$

$$\begin{cases} 9x + 5y - z = -11 \\ 6x + 4y + 2z = 2 \\ 2x - 2y + 4z = 4 \end{cases}$$

$$\begin{bmatrix} 9 & 5 & -1 \\ 6 & 4 & 2 \\ 2 & -2 & 4 \end{bmatrix}^{-1} \begin{bmatrix} -11 \\ 2 \\ 4 \end{bmatrix}$$

$$x = -2 \quad y = 2 \quad z = 3$$

Solve the following systems without using a calculator. (substitution and elimination).

$$14. \begin{cases} 11x - 7y = -14 \\ -11(x - 2y) = -4 \end{cases} \quad (0, 2)$$

$$\begin{cases} 11x - 7y = -14 \\ -11x + 22y = 44 \end{cases}$$

$$\frac{15y}{15} = \frac{30}{15}$$

$$y = 2$$

$$x - 2(2) = -4$$

$$x - 4 = -4$$

$$x = 0$$

$$15. \begin{cases} 2(2x - 3y) = 6 \\ -4x + 6y = 6 \end{cases}$$

$$\begin{cases} 4x - 6y = 12 \\ -4x + 6y = 12 \end{cases}$$

$$0 = 24$$

NO SOLUTION

16. Use the **quadratic formula** to solve $y = 2x^2 - 12x + 8$.

$$a=2 \quad b=-12 \quad c=8$$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\begin{array}{r} 2 \overline{) 80} \\ 2 \overline{) 40} \\ 2 \overline{) 20} \\ 2 \overline{) 10} \\ 5 \end{array}$$

$$\frac{-(-12) \pm \sqrt{(-12)^2 - 4(2)(8)}}{2(2)}$$

$$\frac{12 \pm \sqrt{80}}{4} = \frac{12 \pm 4\sqrt{5}}{4} = \boxed{3 \pm \sqrt{5}}$$

17. Given a parabola with roots of $(-3, 0)$ and $(7, 0)$ that also passes through the point $(2, 100)$, write the equation of the quadratic in standard form.

$$y = a(x+3)(x-7)$$

$$100 = a(2+3)(2-7)$$

$$100 = a(5)(-5)$$

$$\frac{100}{-25} = \frac{-25a}{-25}$$

$$-4 = a$$

$$y = -4(x+3)(x-7)$$

$$y = -4(x^2 - 4x - 21)$$

$$\boxed{y = -4x^2 + 16x + 84}$$

18. Describe the transformations from $f(x) = x^2$ to the following equations:

a) $j(x) = 2f(x-3)$

Vertical stretch
Right 3

b) $k(x) = f(-x) + 7$

Horizontal Reflection
up 7

19. You need to buy filing cabinets. You know that Cabinet X costs \$10 per unit and requires six square feet of floor space. Cabinet Y costs \$20 per unit and requires eight square feet of floor space. You have been given \$140 for this purchase, though you don't have to spend that much. The office has room for no more than 72 square feet of cabinets. Fill in the following information to represent this situation. (DO NOT SOLVE).

Variables:

Cabinet X
Cabinet Y

Objective Function:

Not enough info !!

Constraints:

Cost $10x + 20y \leq 140$

Sq. ft. $6x + 8y \leq 72$

20. Identify the vertex of the following quadratic by **completing the square**.

$$y = 2x^2 - 4x + 8$$

$$y - 8 = 2x^2 - 4x$$

$$y - 8 + \frac{2}{2} = 2(x^2 - 2x + 1)$$

$$y - 6 = 2(x - 1)^2$$

$$y = 2(x - 1)^2 + 6$$

vertex (1, 6)

21. Describe the transformations from $p(x)$ to $m(x)$.

a. $p(x) = x^5$; $m(x) = 0.5p(-x) + 4$

b. $p(x) = x^4$; $m(x) = -p(0.5x) + 2$

Vertical Compression
Horizontal Reflection
up 4

Vertical Reflection
Horizontal Stretch
up 2

Given the equations in factored form, answer the questions.

22. $y = (1 - 2x)(2x + 1)(x + 4)$

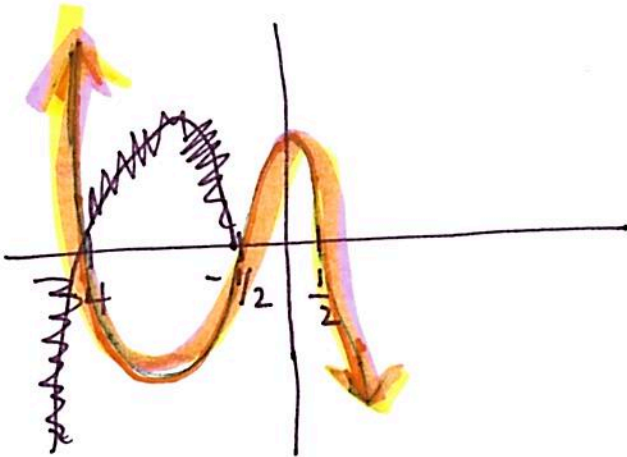
Roots:

$1 - 2x = 0$	$2x + 1 = 0$	$x + 4 = 0$
$-2x = -1$	$2x = -1$	$x = -4$
$x = 1/2$	$x = -1/2$	$x = -4$
M1	M1	M1

Write the multiplicity under each root.

End behavior
odd / negative $\uparrow \downarrow$

Sketch the graph.



Standard form: (Show Work!)

$$(1 - 2x)(2x + 1)$$

$$2x + 1 - 4x^2 - 2x$$

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

$$-4x^3 + 4x^2 + 1x - 16x^2 + 16x + 4$$

$$y = -4x^3 - 12x^2 + 17x + 4$$

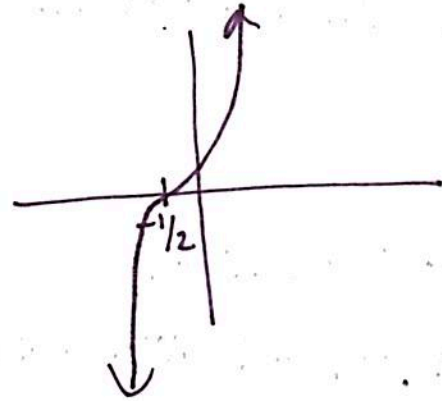
23. $y = (2x + 1)(4x^2 + 4x + 1)$
 $(2x + 1)(2x + 1)(2x + 1)$
 Roots: $(2x + 1)^3$

$x = -1/2$
 M3

Write the multiplicity under each root.

End behavior
odd / positive $\downarrow \uparrow$

Sketch the graph.



Standard form: (Show Work!)

$$(2x + 1)(4x^2 + 4x + 1)$$

$$8x^3 + 8x^2 + 2x + 4x^2 + 4x + 1$$

$$y = 8x^3 + 12x^2 + 6x + 1$$

24. Find the remainder of the following: $(x^4 + 3x^2 + x + 4) \div (x + 3)$

$$\begin{array}{r|rrrrr} -3 & 1 & 0 & 3 & 1 & 4 \\ & \downarrow & -3 & 9 & -36 & 105 \\ \hline & 1 & -3 & 12 & -35 & 109 \end{array}$$

or $(-3)^4 + 3(-3)^2 + (-3) + 4$
109

Find the quotient of the following.

25. $(4x^4 - 15x^2 - 4) \div (x + 2)$

$$\begin{array}{r|rrrrr} -2 & 4 & 0 & -15 & 0 & -4 \\ & \downarrow & -8 & 16 & -2 & 4 \\ \hline & 4 & -8 & 1 & -2 & 0 \end{array}$$

$$\boxed{4x^3 - 8x^2 + x - 2}$$

27. $(3x^3 + 34x^2 + 72x - 64) \div (x^2 + 12x + 32)$

$$\begin{array}{r} 3x - 2 \\ \hline x^2 + 12x + 32 \overline{) 3x^3 + 34x^2 + 72x - 64} \\ \underline{-(3x^2 + 36x^2 + 96x)} \\ -2x^2 - 24x - 64 \\ \underline{-(-2x^2 - 24x - 64)} \\ 0 \end{array}$$

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

$$\begin{array}{r} x + 4 \\ \hline x^3 + 0x^2 + 0x - 1 \overline{) x^4 + 4x^3 + 0x^2 - x - 4} \\ \underline{+(x^4 + 0x^3 + 0x^2 + x)} \\ 4x^3 + 0x^2 + 0x - 4 \\ \underline{-(4x^3 + 0x^2 + 0x - 4)} \\ 0 \end{array}$$

Factor the following completely.

28. $8x^3 - 343$ $\sqrt[3]{8x^3} = \boxed{2x = a}$

$\sqrt[3]{343} = \boxed{7 = b}$

$$\boxed{(2x - 7)(4x^2 + 14x + 49)}$$

29. $-4x^4 - 500x$

$$\sqrt[3]{x^3} = \boxed{x = a}$$

$$\sqrt[3]{125} = \boxed{5 = b}$$

$$\boxed{-4x(x + 5)(x^2 - 5x + 25)}$$

30. Write a polynomial equation given the zeros of the function are $\frac{2}{5}$, -3, and 1.

$$(X - \frac{2}{5})(X+3)(X-1) \cdot (X-1)(15x^2+13x-6)$$

$$(5x-2)(X+3)(X-1)$$

$$5x^2+15x-2x-6$$

$$15x^2+13x-6$$

$$15x^3 + 13x^2 - 6x - 15x^2 - 13x + 6$$

$$y = 15x^3 - 2x^2 - 19x + 6$$

31. Write a polynomial equation given the zeros of the function are $3 \pm 2i$ and 5.

$$(X-3+2i)(X-3-2i)(X-5)$$

X	-3	-2i	
X	X ²	-3x	-2ix
-3	-3x	+9	+6i
+2i	+2ix	-6i	-4i ²

$$X^2 - 6x + 9 - 4i^2$$

$$X^2 - 6x + 9 - 4(-1)$$

$$X^2 - 6x + 9 + 4$$

$$X^2 - 6x + 13$$

$$(X-5)(X^2 - 6x + 13)$$

$$X^3 - 6x^2 + 13x - 5x^2 + 30x - 65$$

$$y = x^3 - 11x^2 + 43x - 65$$

Solve the following inequality

32. $x^3 + x^2 - 16x > 16$

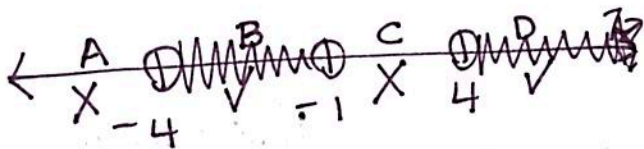
$$x^3 + x^2 - 16x - 16 > 0$$

X	+1	
X ²	X ³	+X ²
-16	-16x	-16

$$(x^2-16)(x+1)$$

$$(x+4)(x-4)(x+1)$$

$$x = -4 \quad x = 4 \quad x = -1$$



Test section C $x=0$

$$0^3 + 0^2 - 16(0) > 16$$

$$0 > 16 \text{ False}$$

$$(-4, -1) \cup (4, \infty)$$

33. $x^3 - 7x^2 \leq 9x - 63$

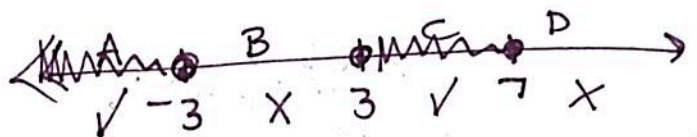
$$x^3 - 7x^2 - 9x + 63 \leq 0$$

X	-7	
X ²	X ³	-7x ²
-9	-9x	+63

$$(x-7)(x^2-9)$$

$$(x-7)(x+3)(x-3)$$

$$x = 7 \quad x = -3 \quad x = 3$$



Test section B

$$0^3 - 7(0)^2 \leq 9(0) - 63$$

$$0 \leq -63$$

$$\text{False}$$

$$(-\infty, -3) \cup (3, 7)$$

Chapter 8 material should be reviewed as well