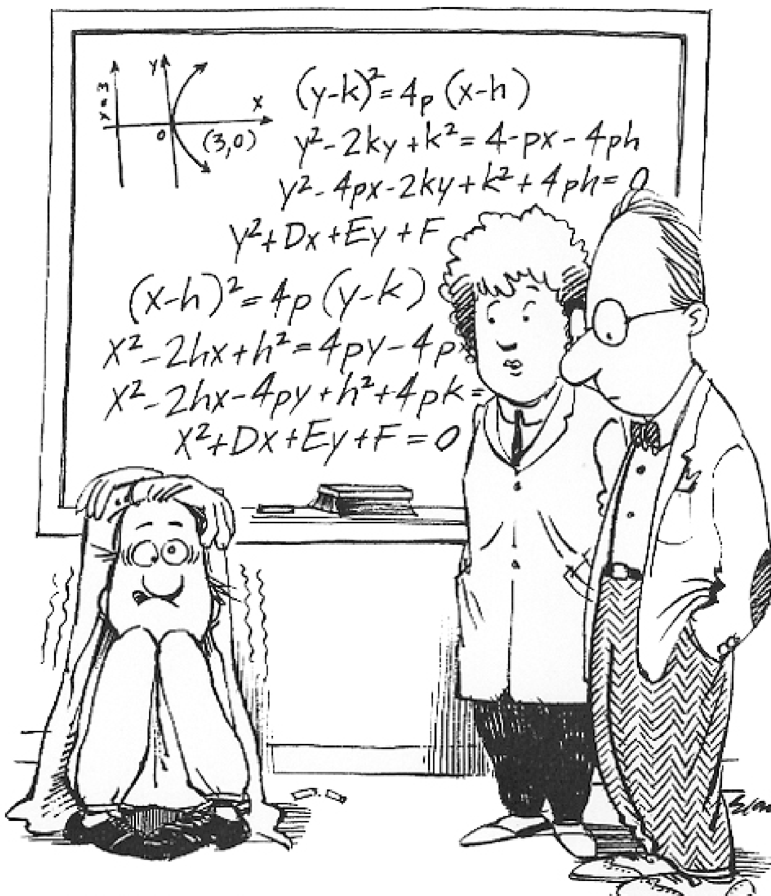
Required Summer Packet

College Algebra/Trig 1–2



" HE COPIED THE PROBLEM WRONG."

MATH SUMMER PACKET

INSTRUCTIONS

Attached you will find a packet of exciting math problems for your enjoyment over the summer. The purpose of the summer packet is to review the topics you have already mastered in math and to make sure that you are prepared for the class you are about to enter.

The packet contains a brief summary and explanation of the topics so you don't need to worry if you don't have your math book. You will find many sample problems, which would be great practice for you before you try your own problems. The explanations are divided into sections to match the sample problems so you should be able to reference the examples easily.

This packet will be **due the second day of class.** All of your hard work will receive credit. The answers are provided in the back of the packet; *however,* you must show an amount of work appropriate to each problem in order to receive credit. If you are unsure of how much work to show, let the sample problems be your guide. You will have an opportunity to show off your skills during the first week when your class takes a quiz on the material in the packet.

This packet is to help you maximize your previous math courses and to make sure that everyone is starting off on an even playing field on the first day of school. If you feel that you need additional help on one or two topics, you may want to try math websites such as: www.mathforum.org or www.askjeeves.com. Math teachers will be available for assistance at the high school the week before school. Check the marquee or the school website for specific times, which are to be determined.

Enjoy your summer and don't forget about the packet. August will be here before you know it! If you lose your packet the OPRFHS Bookstore will carry extra copies. You will also be able to access the packets on line at the school website, www.oprfhs.org.

See you in August!

The OPRFHS Math Department

SUMMER PACKET
For Students Entering College Algebra Trig 1–2

Name ____

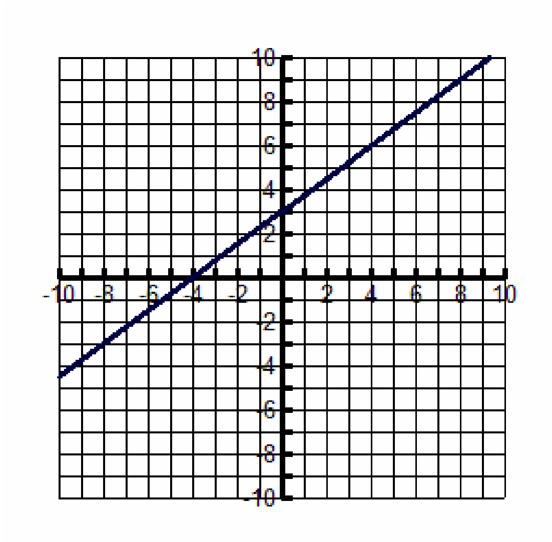
Welcome to College Algebra/Trig. This packet contains the topics that you have learned in your previous courses that are most important to this class. This packet is meant as a REVIEW. Please read the information, do the sample problems and be prepared to turn this in when school begins again.

Enjoy your summer!

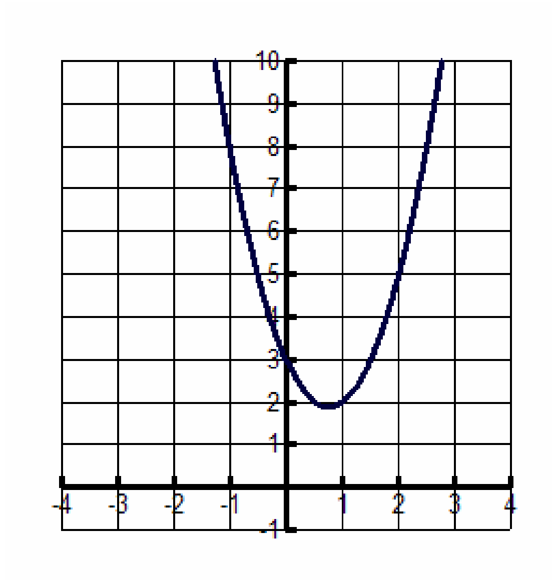
I. **Using your graphing calculator** (Keystrokes below are based on using a TI 83-Plus or TI 84 Calculator):

A. Be able to do **basic graphing**

a) Graph $y = \frac{3}{4}x + 3$

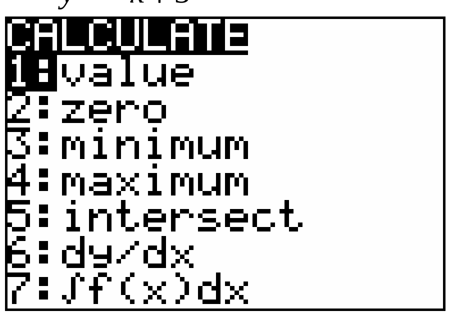


b) Graph $y = 2x^2 - 3x + 3$



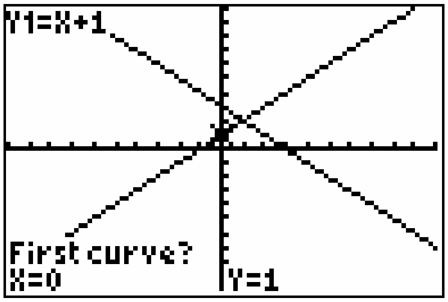
c) **Find the intersection** of the lines $\begin{matrix} y - x = 1 \\ y + x = 3 \end{matrix}$ using the intersection function on your calculator. .

1. Solve the above Equations for y. $\begin{matrix} y = x + 1 \\ y = -x + 3 \end{matrix}$ 2. Graph on calculator 3. Press **2nd** **TRACE** for the.

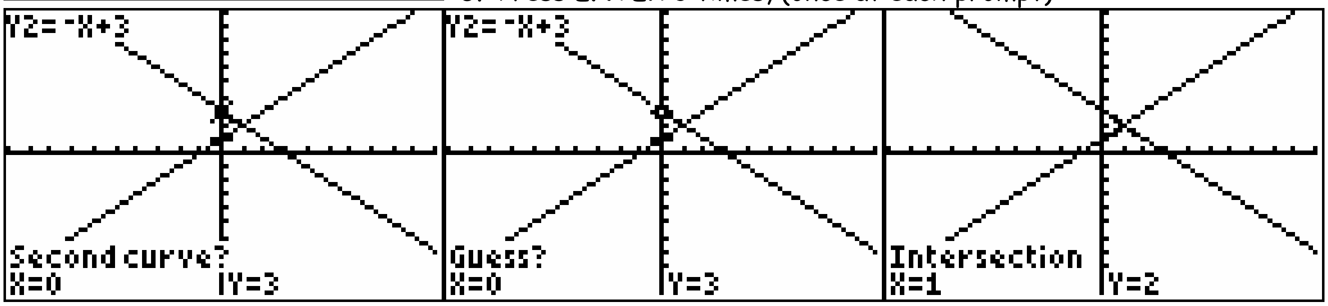


CALC menu. Your screen should look like the one below

4. Press **5** for **INTERSECT** or cursor down and press **ENTER**. Your screen should now look like this:

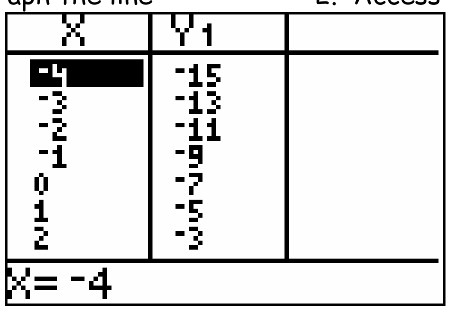


5. Press **ENTER** 3 times, (once at each prompt)



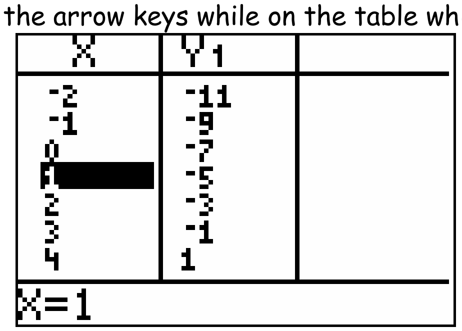
6. The *x* and *y* coordinates appear at the bottom of the screen. You screen should look like the third one above. The solution to the system is $(1,2)$

d) Find values **using tables**. 1. Graph the line $y = 2x - 7$ 2. Access the table by pressing **2nd GRAPH**. .

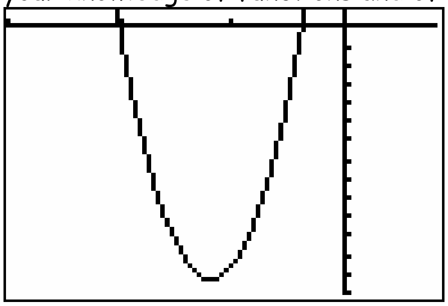


The table screen should look like the one below

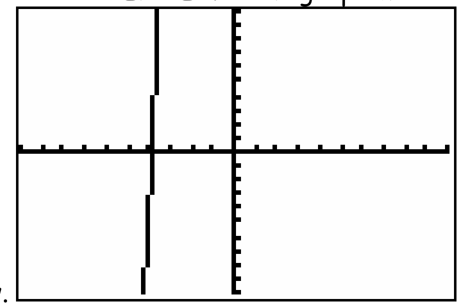
3. You can move up and down using the arrow keys while on the table while the cursor is on the x-values.



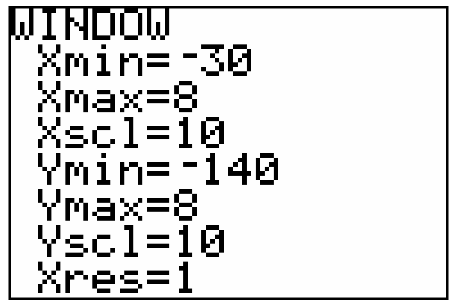
e) To see the graph of $f(x)=2(x+12)^2-133$, be able to **set the window manually**, using both your knowledge of functions and of the calculator.



In order to view the function on the left, first press **ZOOM 6** and then **ENTER**. Your graph will look like the one below.



Now, set your window by pressing the **WINDOW** key and changing the values to look like the ones Below.



Your graph should look like the one at the left.

B. Convert between decimal degrees and **degrees, minutes and seconds** using the angle function.

(You will access this function by going to the **ANGLE** menu.)

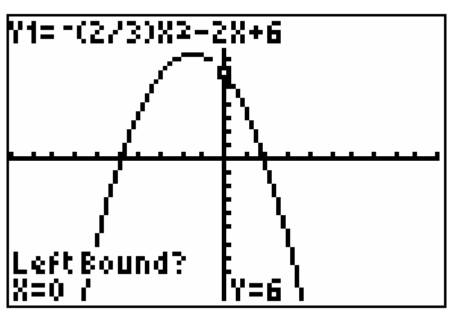
Problem: $78°07'30" \approx 78.66666667°$

$43.26° = 43°15'36"$

C. Be able to find the **zeros,** (also known as **roots** or **x-intercepts**) using the calculation menu.

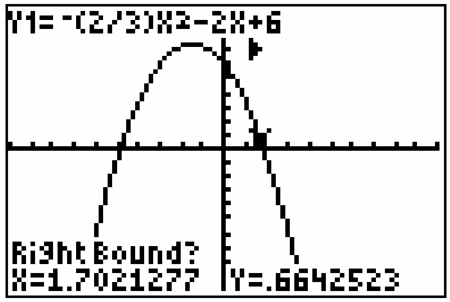
Problem: Find the zeros of $f(x)=-\frac{2}{3}x^2-2x+6$.

1. Enter the function into the calculator. Be sure to press **ZOOM 6** in order to go back to the standard screen.
2. Press **CALC** **(**2^{nd} TRACE) to access the calculate menu
3. Press 2 (or cursor down) and hit **ENTER** for **ZERO.** Your screen will now look like this:

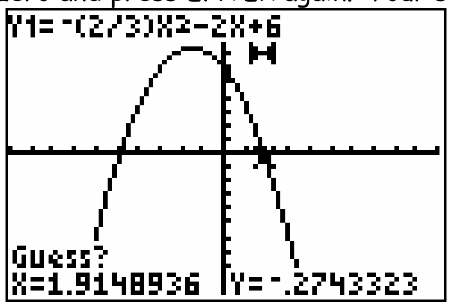


4. Use the arrow keys to move the cursor close to where the function crosses the x-axis and press ENTER.

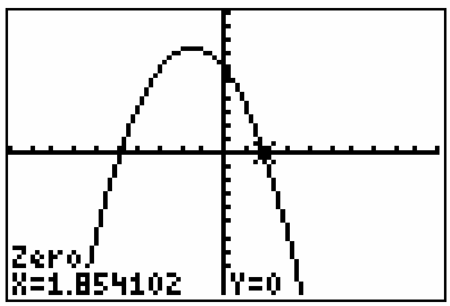
Your screen should now look like this:



5. Move cursor to the right of the zero and press ENTER again. Your screen should look like the one below.

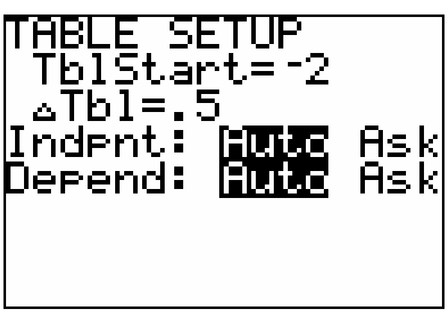


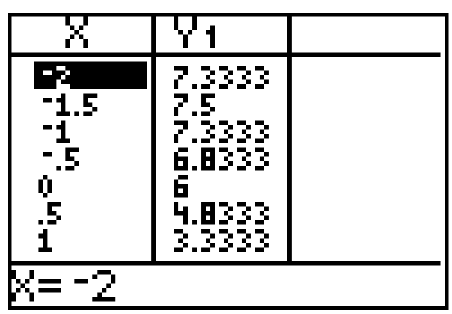
6. Press ENTER a third time and the x and y coordinates of that x-intercept will be on the bottom of the screen.



D. Know how to use the **Table Set** function.

1. Access the Table Set (**TBLSET**) function by pressing **2nd** **WINDOW**. You can change the TABLE so that the x-value increases by different increments. For example, cursor down to $\Delta Tbl =$ ____ and change the number 0.5. Then the independent variable will increase by 0.5





2. Go to the **TABLE (2nd GRAPH)** and confirm this.

E. **Store function** – To store a value in for a variable is used when evaluating a function or testing the solution to a problem

1. Enter the value you want to store, which can be an expression.
2. Press STO →. The store symbol (→) is displayed.
3. Type the variable name, using Alpha if necessary 15→*x*
4. Press enter.

You entered value (*ex.* 15) will appear when you type in *x* and press enter. You can evaluate an expression for *x* = 15 by typing in 2*x* + 9 and when you hit enter the value of 39 will be seen on the screen.

II. Polynomials: Basic Operations

Expand Polynomials including multiplying two binomials, binomials by polynomials and cubing binomials.

Multiply the following:

1 . $7x^3y\left(2x^2y+5xy^3\right)=14x^5y^2+35x^4y^4$

2. $(2x-3)(x+4)=2x^2+5x-12$

3.
$$(x-4)\left(2x^2+3x-6\right)=2x^3+3x^2-6x$$
$$-8x^2-12x+24$$
$$=2x^3-5x^2-18x+24$$

4.
$$(a+b)^3=a^3+3a^2b+3ab^2+b^3$$
$$(a-b)^3=\left(a+(-b)\right)^3$$
$$(x+2)^3=x^3+6x^2+18x+8$$
$$(x-2)^3=x^3-6x^2+12x-8$$

Be a **factoring** expert! This is very important. You should be comfortable factoring out the greatest common factor from an expression, factoring by grouping, factoring quadratics when the leading coefficient is one *and* when the leading term is something other than one. For example, you should be able to factor the following:

1. $12x^2y-20x^3y=4x^2y(3-5x)$

2. $\left(x^2-9\right)=(x+3)(x-3)$

3. $x^2+7x+12=(x+4)(x+3)$

4. $3x^2-10x-8=(3x+2)(x-4)$

5. $x^4+3x^2-10=\left(x^2+5\right)\left(x^2-2\right)$

6. Using:
$$a^3+b^3=(a+b)\left(a^2-ab+b^2\right)$$
$$a^3-b^3=(a-b)\left(a^2+ab+b^2\right)$$

Factor: $125x^3+y^3=(5x+y)\left(25x^2-5xy+y^2\right)$

Factor: $x^3-27y^3=(x-3y)\left(x^2+3xy+9y^2\right)$

III. Rational Expressions

1. Be able to **reduce** a rational expression. Problem: Simplify the rational expression below.

$$\frac{9x^2+6xy-3y^2}{12x^2-12y^2} = \frac{3\left(x^2+2xy-y^2\right)}{12\left(x^2-y^2\right)}$$

$$= \frac{3(x+y)(3x-y)}{3(4)(x+y)(x-y)}$$

Factor the numerator and denominator

$$= \frac{3(x+y)}{3(x+y)} \cdot \frac{3x-y}{4(x-y)}$$ Commutative Property

$$= \frac{3x-y}{4(x-y)}$$ Reduce fraction

2. Add, subtract, multiply and divide rational expressions.

Problem: Multiply and simplify $\frac{x+2}{x-3} \cdot \frac{x^2-4}{x^2+x-2} = \frac{(x+2)\left(x^2-4\right)}{(x-3)\left(x^2+x-2\right)}$

Multiply the numerator and denominator $= \frac{(x+2)(x+2)(x-2)}{(x-3)(x+2)(x-1)}$

Factor and reduce $= \frac{(x+2)(x-2)}{(x-3)(x-1)}$

Simplify

Problem: Divide and simplify $\frac{a^3-b^3}{a^2-b^2} \div \frac{a^2+ab+b^2}{a^2+2ab+b^2} = \frac{a^3-b^3}{a^2-b^2} \cdot \frac{a^2+2ab+b^2}{a^2+ab+b^2}$

Multiply by the reciprocal $= \frac{(a-b)\left(a^2+ab+b^2\right)(a+b)(a+b)}{(a-b)(a+b)\left(a^2+ab+b^2\right)}$

Factor and reduce $= a+b$

Problem: Addition of rational expressions $\frac{3}{x+2} + \frac{5-x}{x^2-4} = \frac{3}{x+2} + \frac{5-x}{(x+2)(x-2)}$

Factor the denominator. Find the least common denominator

$LCD=(x+2)(x-2)$ $$=\frac{(x-2)}{(x-2)}\cdot\frac{3}{(x+2)}+\frac{5-x}{(x+2)(x-2)}$$

Multiply by 1 in the form $\frac{(x-2)}{(x-2)}$ $$=\frac{3x-6}{(x+2)(x-2)}+\frac{5-x}{(x+2)(x-2)}$$

Multiply fractions $$=\frac{3x-6+5-x}{x^2-4}$$

Combine numerator and simplify $$=\frac{2x-1}{x^2-4}$$

Problem: Subtraction of rational expressions. Changing the above problem to a subtraction problem:

$$\frac{3}{x+2}-\frac{5-x}{x^2-4}=\frac{3}{x+2}-\frac{5-x}{(x+2)(x-2)}$$

Following the steps above, find LCD and multiply by 1 $$=\frac{3x-6-(5-x)}{x^2-4}$$

Remember to **distribute the negative!** $$=\frac{4x-11}{x^2-4}$$

Problem: Solving rational **equations**. $$\frac{14}{x+2}-\frac{1}{x-4}=1$$

Multiply both sides by the **least common demoninator**. $(x+2)(x-4)\left[\frac{14}{x+2}-\frac{1}{x-4}\right]=(1)(x+2)(x-4)$

Using the distributive law: $(x-2)(x-4)\left(\frac{14}{x+2}\right)-(x-2)(x-4)\left(\frac{1}{x-4}\right)=(x-2)(x-4)(1)$

Simplify: $14(x-4)-(x+2)=(x+2)(x-4)$ $14x-56-x-2=x^2-2x-8$ $0=x^2-15x+50$
$0=(x-10)(x-5)$ $0=x-10$ *or* $0=x-5$ The solutions are: $x=10,\ 5$

Problem: Solve: $\frac{7x-12}{x-3}-\frac{x^2}{x+3}=\frac{54}{x^2-9}$ Multiply both sides by the LCD:

$$(x-3)(x+3)\left[\frac{7x-12}{x-3}-\frac{x^2}{x+3}\right]=(x-3)(x+3)\left(\frac{54}{x^2-9}\right)$$

Distribute: $(x-3)(x+3)\left(\frac{7x-12}{x-3}\right)-(x-3)(x+3)\left(\frac{x^2}{x+3}\right)=(x-3)(x+3)\left(\frac{54}{x^2-9}\right)$

Simplify: $(x+3)(7x-12)-(x-3)(x^2)=54$ $\quad 7x^2+9x-36-(x^3-3x^2)=54$ Distribute the negative sign and continue simplifying: $7x^2+9x-36-x^3+3x^2=54$ $\quad -x^3+10x^2+9x-36=54$ Subtract 54 and multiply by -1: $x^3-10x^2-9x+90=0$ Factor: $x^2(x-10)-9(x-10)=0$ $\quad (x^2-9)(x-10)=0$

Solve: $x^2-9=0$ *or* $x-10=0$; $x=\pm 3$ *or* $x=10$. Since x cannot be equal to ± 3, as the denominator in the original equation will be zero, the only solution is $x=10$.

3. Multiply by the LCD (x^2)

$$\frac{\frac{2}{x}-1}{\frac{4}{x^2}-1}=\frac{\left[\frac{2}{x}-1\right]x^2}{\left[\frac{4}{x^2}-1\right]x^2}$$

$$=\frac{2x-x^2}{4-x^2} \quad \text{(Distribute)}$$

$$=\frac{x(2-x)}{(2+x)(2-x)} \quad \text{(Factor)}$$

$$=\frac{x}{2+x} \quad \text{(Reduce)}$$

4. Know the difference between *solving* and *simplifying* a rational expression.

You would *simplify*: $\frac{2x+1}{x+3}-\frac{x-1}{x-7}$

while you would *solve*: $\frac{2x+1}{x+3}-\frac{x-1}{x-7}=1$

IV. Exponents

Definitions and Rules for Exponents

For any integers *m* and *m* and *n* (assuming 0 is not raised to a nonpositive power):

Zero as an exponent: $a^0 = 1$

Negative exponents:

$$a^{-n} = \frac{1}{a^n}; \frac{a^{-n}}{b^{-m}} = \frac{b^m}{a^n}; \left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n$$

Multiplying with like bases:

$a^m \cdot a^n = a^{m+n}$ (Product Rule)

Dividing with like bases:

$\frac{a^m}{a^n} = a^{m-n}; a \neq 0$ (Quotient Rule)

Raising a product to a power:

$(ab)^n = a^n b^n$

Raising a power to a power:

$(a^m)^n = a^{mn}$ (Power Rule)

Raising a quotient to a power:

$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}; b \neq 0$

Know the properties of exponents and be able to simplify all types of exponents, including negative and fractional exponents. For example:

$$x^{\frac{5}{6}} \cdot x^{\frac{2}{3}} = x^{\frac{5}{6}+\frac{2}{3}}$$
$$= x^{\frac{9}{6}} = x^{\frac{3}{2}} = \sqrt{x^3}$$
$$= x\sqrt{x}$$

1. Be able to find the n^{th} root of real numbers. For example:

$$9^{\frac{1}{2}} = 3$$
$$27^{\frac{1}{3}} = 3$$
$$(-8)^{\frac{1}{3}} = -2$$

2. Simplify using rational exponents.

$$\left(\frac{4x^{\frac{1}{3}}}{x^{\frac{1}{2}}}\right)^{\frac{1}{2}} = \frac{2}{x^{\frac{1}{12}}}$$

$$\left(4x^{\frac{1}{3}} \cdot x^{-\frac{1}{2}}\right)^{\frac{1}{2}}$$

$$4^{\frac{1}{2}} x^{\frac{1}{6}} x^{-\frac{1}{4}} = 4^{\frac{1}{2}} x^{-\frac{1}{12}} = \frac{2}{x^{\frac{1}{12}}}$$

V. Radicals

- ***Simplify*** radicals. Express radicals in simplest radical form.

$$\sqrt{x^2} = |x| \qquad \sqrt{27y^4} = 3y^2\sqrt{3}$$

$$\sqrt[3]{8x^2y^3} = 2y\sqrt[3]{x^2} \qquad \sqrt{\frac{8x^3}{y^2}} = 2\frac{x}{y}\sqrt{2x}$$

- ***Multiplication*** of radicals.

$$\sqrt{2} \cdot \sqrt{12} = \sqrt{24} = \sqrt{4.6} = 2\sqrt{6}$$

$$\sqrt[3]{(x+1)} \cdot \sqrt[3]{2x} \;\; \sqrt[3]{2x(x+1)} = \sqrt[3]{2x^2+2x}$$

- ***Addition*** of radicals. (Radicals must be the same.)

$$2\sqrt{3x} + 4\sqrt{3x} = 6\sqrt{3x}$$

$$-5\sqrt{4x} + 2\sqrt{9x} \;\; -5(2)\sqrt{x} + 2(3)\sqrt{x} = -10\sqrt{x} + 6\sqrt{x} = -4\sqrt{x}$$

Note: Unlike radicals $\sqrt{2y} + \sqrt[3]{2y}$ Do not combine.

- ***Subtraction*** of radicals.

$$3\sqrt{8y} - 24\sqrt{2y} = (3)(2)\sqrt{2y} - 24\sqrt{2y} = 6\sqrt{2y} - 24\sqrt{2y} = -18\sqrt{2y}$$

$$\frac{1}{2}\sqrt[3]{5y^3} - \frac{1}{3}\sqrt[3]{5y^3} = \frac{1}{2}y\sqrt[3]{5} - \frac{1}{3}y\sqrt[3]{2}$$

- ***Division of radicals.***

$$\frac{\sqrt{28x^3}}{\sqrt{4x}} = \sqrt{\frac{28x^3}{4x}} = \sqrt{7x^2} = |x|\sqrt{7}$$

$$\frac{\sqrt[3]{27y^3}}{\sqrt[3]{9y^2}} = \sqrt[3]{\frac{27y^3}{9y^2}} = \sqrt[3]{3y}$$

$$\frac{18\sqrt{72}}{6\sqrt{6}} = 3\sqrt{\frac{72}{6}} = 3\sqrt{12} \;\; 3(2\sqrt{3}) = 6\sqrt{3}$$

- **Finding Conjugates**

The conjugate of $2+\sqrt{3}$ *is* $2-\sqrt{3}$

The conjugate of $-\frac{1}{2}-\sqrt{5}$ *is* $-\frac{1}{2}+\sqrt{5}$

The conjugate of $-\sqrt{6}$ *is* $\sqrt{6}$

The conjugate of $\sqrt{3}+\sqrt{5}$ *is* $\sqrt{3}-\sqrt{5}$

- ***Rationalizing, Denominators or Numerators***

$$\sqrt{\frac{3}{5}} = \frac{\sqrt{3}}{\sqrt{5}} = \frac{\sqrt{3}}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{\sqrt{15}}{\sqrt{25}} = \frac{\sqrt{15}}{5}$$

$$\frac{\sqrt{2a}}{\sqrt{5b}} = \frac{\sqrt{2a}}{\sqrt{5b}} \cdot \frac{\sqrt{5b}}{\sqrt{5b}} = \frac{\sqrt{10ab}}{\sqrt{25b^2}} = \frac{\sqrt{10ab}}{5|b|}$$

$$\frac{\sqrt{2}}{3+\sqrt{5}} = \frac{\sqrt{2}}{\left(3+\sqrt{5}\right)}\frac{\left(3-\sqrt{5}\right)}{\left(3-\sqrt{5}\right)} = \frac{3\sqrt{2}-\sqrt{15}}{9-\sqrt{25}} = \frac{3\sqrt{2}-\sqrt{15}}{9-5} = \frac{3}{4}\sqrt{2} - \frac{1}{4}\sqrt{15}$$

1. Simplify radicals. Be able to express the following in simplest radical form:

$$\sqrt{12x^3y^5z^2} = 2xy^2z\sqrt{3xy}$$

$$\sqrt[5]{64x^7y^{10}z^3} = (2xy^2)\sqrt[5]{2x^2z^3}$$

2. Know the difference between exact versus approximate answers. For example, $\sqrt{3}$ is *exact*, while 1.732050808 is an *approximation*.

VI. Linear Equations

1. Have knowledge of linear equations. Know how to use the following formulas:

$$m = \frac{y_2 - y_1}{x_2 - x_1},\ where\ x_1 \neq x_2$$

$$y = mx + b$$

$$y - y_1 = m\left(x - x_1\right)$$

When 2 lines are parallel $(\parallel)$ their slopes are the same.

When 2 lines are perpendicular $(\perp)$ their slopes are opposite reciprocals.

$$m_1m_2 = -1$$

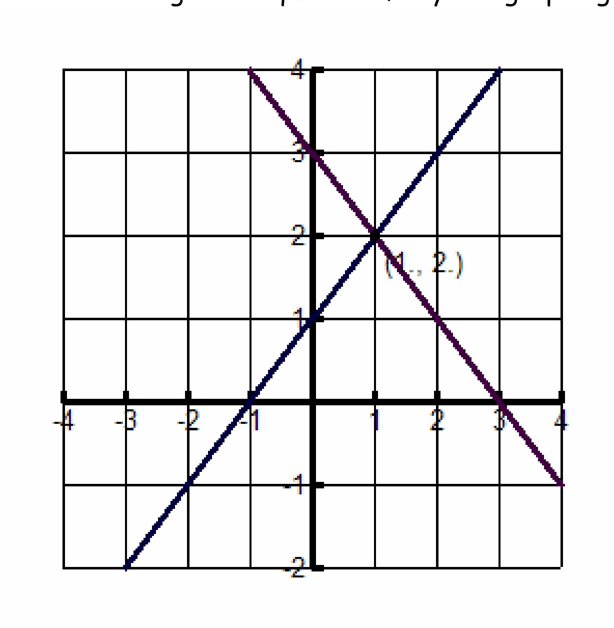
2. Solve systems of linear equations in two and three unknowns, using substitution, linear combination and matrices.

3. Be able to find the intersection of two lines on your calculator.

Problem: Solve **graphically**: $\begin{aligned} y - x &= 1 \\ y + x &= 3 \end{aligned}$

Solving both equations for y and graphing yields:

The solution to the system is $(1,2)$



Problem: Solve using **substitution**. $\begin{aligned} 2x + y &= 6 \\ 3x + 4y &= 4 \end{aligned}$

Solve the first equation for y. $y = 6 - 2x$

Since y and $6-2x$ are equivalent, substitute $6-2x$ for y into the second equation.

$$3x + 4(6-2x) = 4$$

Use the distributive property. $3x + 24 - 8x = 4$

Solve for x. $x = 4$

Substitute 4 for x in either equation and solve for y.

$$2x + y = 6$$
$$2 \cdot 4 + y = 6$$
$$y = -2$$

The solution is the ordered pair $(4,-2)$

Problem: Solve using **linear combination**:

$$\begin{array}{rr} & 3x-4y=-1 \\ + & -3x+2y=0 \\ \hline & -2y=-1 \end{array} \qquad \text{Add the } x\text{'s and add the } y\text{'s}$$

Solving for y yields: $y=\frac{1}{2}$.

Substitute $y=\frac{1}{2}$ into either of the two original equations: $-3x+2\left(\frac{1}{2}\right)=0$

Solve for : $x=\frac{1}{3}$

The solution is the ordered pair $\left(\frac{1}{3},\frac{1}{2}\right)$

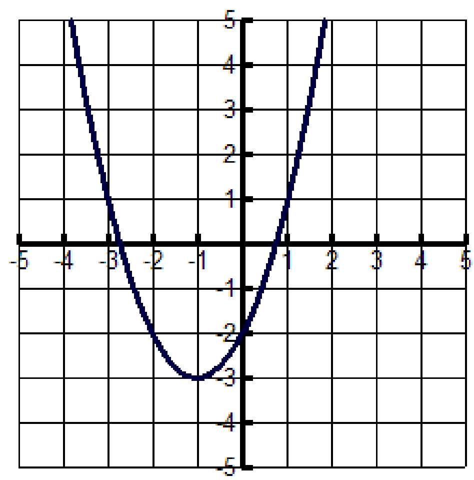
VII. Functions

1 Know how to use function notation and what it means. $f(2)=5 \longrightarrow (2,5)$

2 Identify a function from a set of ordered pairs, a graph or an equation.

3 Determine the domain and range of a function from a graph.

Given the graph:



Domain All Real Numbers

Range $y \geq -3$

4 Evaluate functions.

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

$f(2) = 15$

$f(0) = 1$

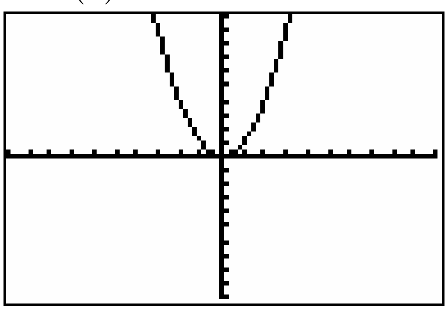
$f(-3) = 55$

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

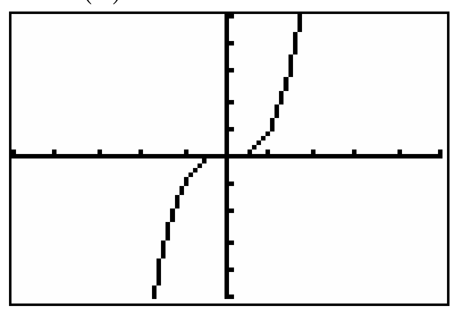
$f(h+1) = 5(h+1)^2 - 3[h+1] + 1 = 5h^2 + 2h + 1 - 3[h+1] + 1 = 5h^2 + 7h + 3$

5 Recognize the graphs of the following functions:

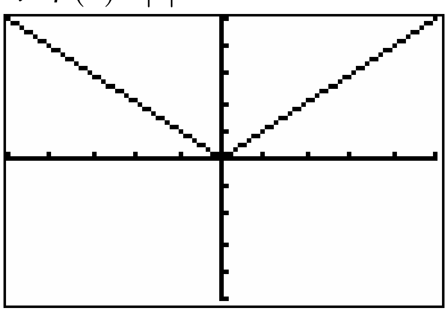
a) $f(x) = x^2$



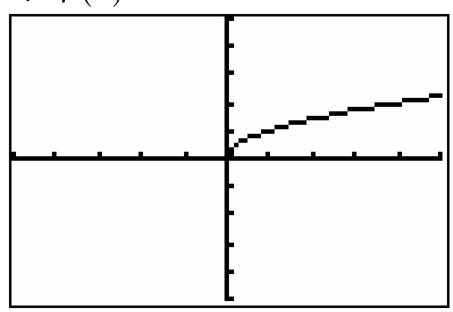
b) $f(x) = x^3$



c) $f(x) = |x|$



d) $f(x) = \sqrt{x}$



VIII. Quadratic Functions

1. Solve quadratic equations using factoring and the quadratic formula.

2. Solve equations in quadratic *form*

a) $x^4 - 3x^2 - 10 = 0$

Factor $(x^2 + 2)(x^2 - 5) = 0$

Set each factor equal to zero $x^2 + 2 = 0$

$x^2 - 5 = 0$

Solve $x = \pm i\sqrt{2}$ or $x = \pm\sqrt{5}$

b) $x - 4\sqrt{x} + 3 = 0$

Substitute: $a = \sqrt{x}$ $a^2 - 4a + 3 = 0$

Solve for a: $a = 1$ or $a = 3$

Substitute: $\sqrt{x} = a$ $\sqrt{x} = 1$ or $\sqrt{x} = 3$

Square both sides: $x = 1$ or $x = 9$

Check your answer!

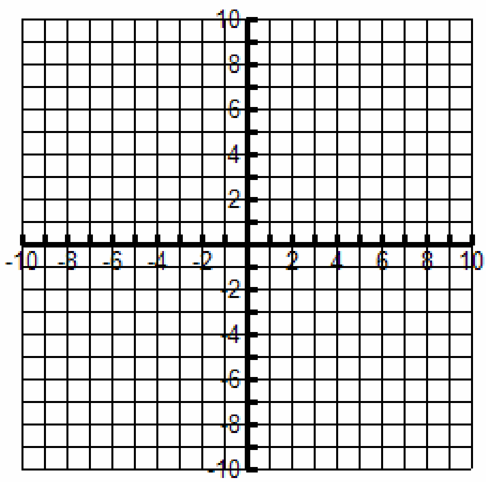
Sample Problems

Complete the problems below, showing work where necessary. Feel free to do your work on separate sheets of paper, which you should attach. Remember you will be required to turn this in. An answer key is provided for you, but in math class, the work is as important as the answer!

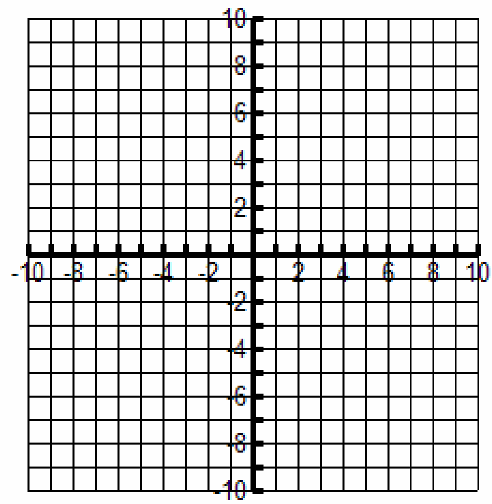
I. Perform the following operations using your graphing calculator.

1. Graph the following on your calculator and sketch the graph on the axis provided.

a) $y = -\frac{7}{6}x - 2$

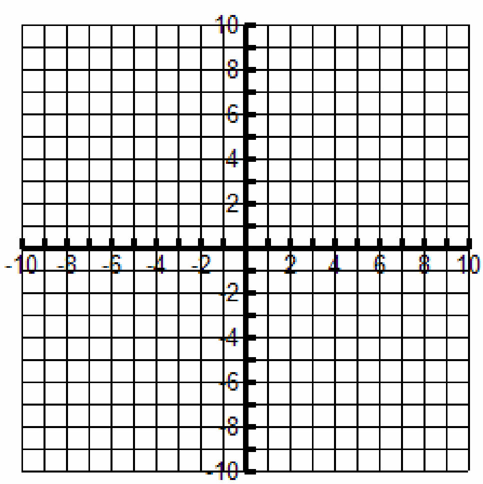


b) $y = 3x^2 - 7x + 3$

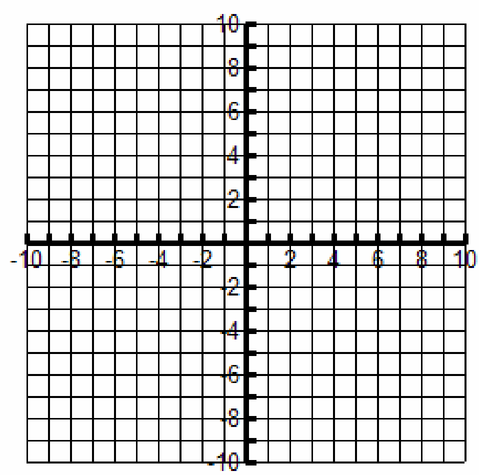


2. Find the intersection of the following systems of equations using your graphing calculator.

a) $\begin{matrix} y - x = 1 \\ y + x = 3 \end{matrix}$



b) $\begin{matrix} x - 5y = 4 \\ y - 2x = 1 \end{matrix}$



3. Find the roots of the following using your graphing calculator: $f(x) = -2(x-1)^2 + 3$.

4. Find the roots of the following using your graphing calculator: $f(x) = -5x^2 + 5x + 3$.

5. Complete the following table for $f(x) = -3x^2 - 5x + 1$, using the ask function on your calculator.

X	Y_2
6	
-2	
1	

6. Find the roots of the following by factoring: $f(x) = 2x^2 + x - 3$

II. Polynomials

Multiply the following:

7. $(2x^2 + 4x + 16)(3x - 4)$

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

9. $(5x + 2y)^2$

10. $(5x^3 + 2y^2)^2$

11. $(m^2 - 2n)^3$

12. $(3t^2 + 4)^3$

13. $(x+h)^2-4(x+h)-9-(2x^2-4x-9)$

Factor the following completely:

14. $w^2-7w+10$

15. $2x^2+6x-56$

16. $9y^2-30y+25$

17. $a(b-2)+c(b-2)$

18. $x^3+3x^2+6x+18$

19. y^2-64z^2

20. $6y^4 - 96x^4$

21. $x^3 - 27$

22. $4t^3 - 32$

23. $6(2p+q)^2 - 5(2p+q)$

III. Rational Expressions

Simplify the following:

24. $\dfrac{(x^2-4)(x+1)}{(x+2)(x^2-1)}$

25. $\dfrac{a^2-a-6}{a^2-7a+12} \cdot \dfrac{a^2-2a-8}{a^2-3a-10}$

26. $\dfrac{3x+12}{2x-8} \div \dfrac{(x+4)^2}{(x-4)^2}$

27. $\dfrac{a^2-a-2}{a^2-a-6} \div \dfrac{a^2-2a}{2a+a^2}$

28. $\dfrac{a-3b}{a+b}+\dfrac{a+5b}{a+b}$

29. $\dfrac{6}{y^2+6y+9}-\dfrac{5}{y+3}$

30. $\dfrac{5a}{a-b}+\dfrac{ab}{a^2-b^2}+\dfrac{4b}{b-a}$

31. $\dfrac{\dfrac{x^2-y^2}{xy}}{\dfrac{x-y}{y}}$

32. $\dfrac{a-\dfrac{a}{b}}{b-\dfrac{b}{a}}$

IV. Exponents

Use the properties of exponents to simplify the following:

33. $\left(4xy^2\right)\left(3x^{-4}y^5\right)$

34. $(2x)^3(3x)^3$

35. $\dfrac{12x^2y^3z^{-2}}{21xy^2z^3}$

36. $\dfrac{\left(3ab^{-2}c^4\right)^3}{\left(2a^{-1}b^2c^{-3}\right)^2}$

37. $Find\ \ -x^2\ \ and\ \ (-x)^2,\ when$

$a)\ x = 5$

$b) x = -7$

V. Radicals

Write the following in simplest radical form:

38. $\sqrt{180}$

39. $\sqrt{162c^4d^5}$

40. $\sqrt{2x^3y}\sqrt{12xy}$

41. $\sqrt[3]{54x^3y^5}$

42. $\frac{\sqrt{21ab^2}}{\sqrt{3ab}}$

43. $\sqrt{\frac{9a^2}{8b}}$

44. $\sqrt{12}-\sqrt{27}+\sqrt{75}$

45. $2\sqrt[3]{8x^2}+5\sqrt[3]{27x^2}-3\sqrt[3]{x^3}$

46. $\left(\sqrt{y}-2\right)\left(\sqrt{y}-4\right)$

47. $\frac{2}{3+\sqrt{5}}$

48. What is the conjugate of $-2+\sqrt{5}$?

____

VI. Linear Functions

49. Write the equation of the line containing the points $(2,-4)\ and\ (4,-3)$ in slope intercept form.

____

50. Determine whether the following lines are parallel, perpendicular or neither.

a) $\begin{array}{l} 2x-5y=-3 \\ 2x+5y=4 \end{array}$ b) $\begin{array}{l} 4y=8-x \\ y=4x-5 \end{array}$ c) $\begin{array}{l} x+2y=5 \\ 2x+4y=8 \end{array}$

____

51. Find the equations of the lines parallel *and* perpendicular to the given line $2x + y = -4$, and containing the given point $(-4, -5)$

52. Solve the following system of equations graphically, *using your calculator.*

$$5x + y = -2$$
$$x + 7y = 3$$

53. Solve using substitution.

$$x - 5y = 4$$
$$y = 7 - 2x$$

54. Solve using the elimination method.

$$2x+3y=5$$
$$4x+7y=11$$

VII. Functions

Using your knowledge of functions answer the following:

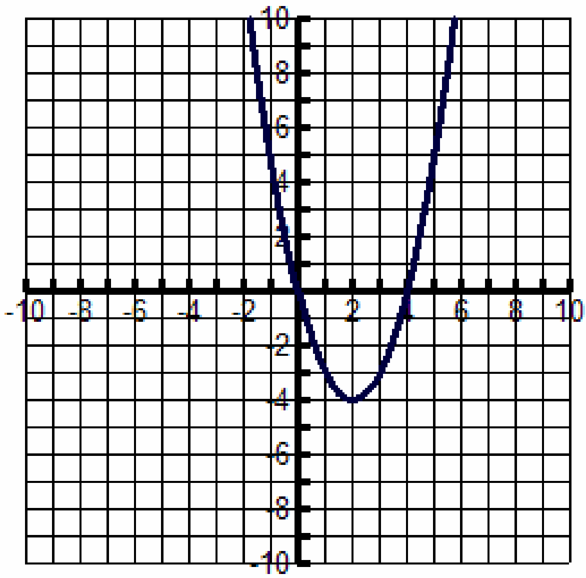
55. Determine whether the following are functions:

a) $\{(2,-3),(7,9),(-11,13),(2,6)\}$

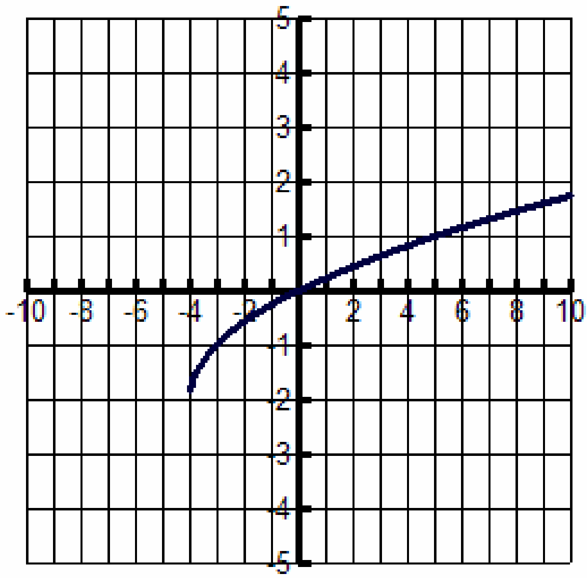
b) $\{(1,19),(-2,11),(6,-9),(7,11)\}$

56. Determine the domain and range of the following graphs:

a)



b)



57. Evaluate the following:

$f(x) = 5x^2 - 4x$ for

a) $f(3)$

b) $f(-2)$

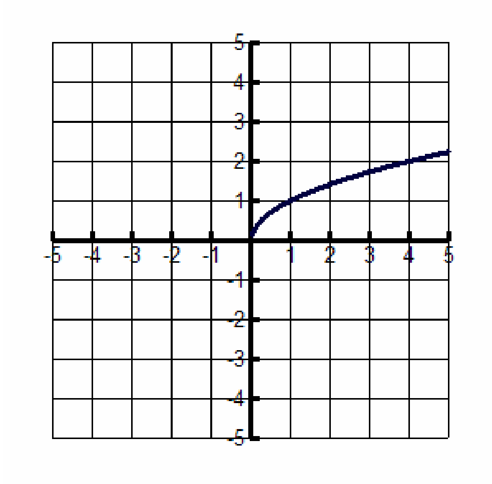
c) $f(t-1)$

58. Following are the graphs of the functions.

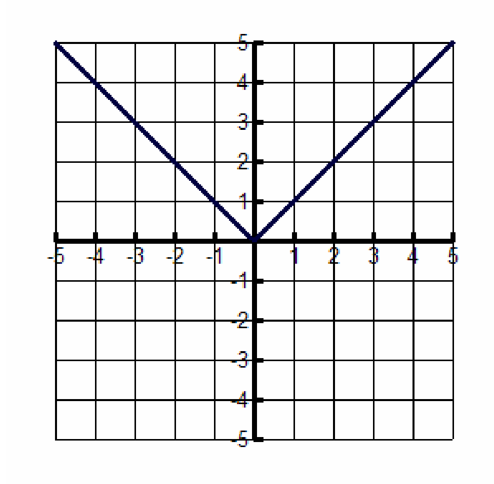
$f(x) = x^2,\quad f(x) = x^3,\quad f(x) = \sqrt{x},\quad and \quad f(x) = |x|$

Label each graph with the correct function.

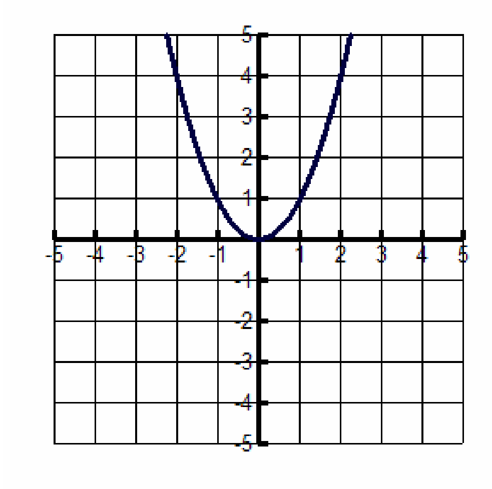
a)________________________________



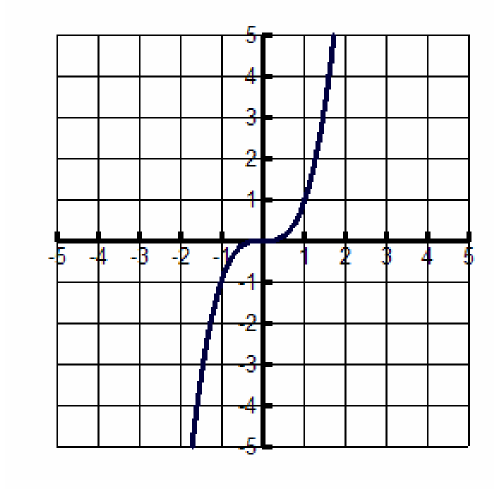
b)________________________________



c)________________________________



d)________________________________



VIII. Quadratic Equations

Solve the following quadratic equations:

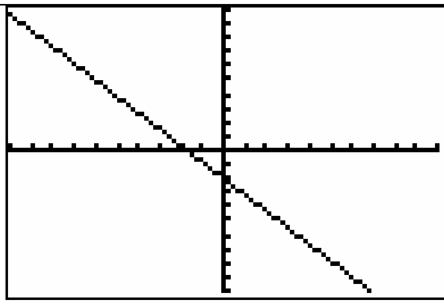
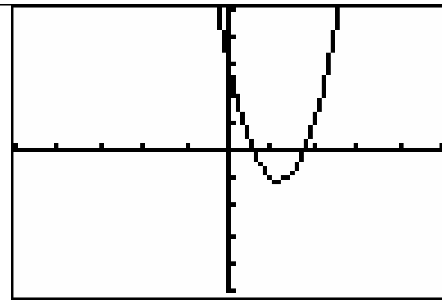
59. $x^2 - 3x - 4 = 0$

60. $2x^2 + 3x = 2$

61. $5x^2 - 3 = 0$

62. $(x-2)^2 - 2(x-2) - 15 = 0$

Answers:

1a. 	1b. 
2a. $\left(1,2\right)$	2b. $\left(-1,-1\right)$
3. $x=-.22,\ 2.22$	4. $x=-.42, 1.42$
5. $\left(6,-137\right)$ $\left(1,-7\right)$ $\left(-2,-1\right)$	6. $x=\frac{-3}{2},\quad x=+1$
7. $6x^3+4x^2+32x-64$	8. $4a^3b^2-10a^2b^2+3ab^3-4ab^2-6b^3$
9. $25x^2\ +\ 20xy+4y^2$	10. $25x^6+20x^3y^2+4y^4$
11. $m^6-6m^4n+12m^2n^2-8n^3$	12. $27t^6+108t^4+144t^2+64$
13. $-x^2+2xh-4h+h^2$	14. $\left(w-5\right)\left(w-2\right)$
15. $2\left(x-4\right)\left(x+7\right)$	16. $\left(3y-5\right)^2$
17. $\left(b-2\right)\left(a+c\right)$	18. $(x^2+6)\left(x+3\right)$
19. $\left(y-8z\right)\left(y+8z\right)$	20. $6(y^2+4x^2)(y+2x(y-2x)$
21. $(x-3)(x^2+3x+9)$	22. $4(t-2)(t^2+2t+4)$
23. $(12p+6q-5)(2p+q)$	24. $\frac{x-2}{x-1}$
25. $\frac{a+2}{a-5}$	26. $\frac{3(x-4)}{2\left(x+4\right)}$
27. $\frac{a+1}{a-3}$	28. 2
29. $\frac{-9-5y}{(y+3)^2}$	30. $\frac{5a^2+2ab-4b^2}{(a+b)(a-b)}$
31. $\frac{x+y}{x}$	32. $\frac{a^2b-a^2}{ab^2-b^2}$
33. $\frac{12y^7}{x^3}$	34. $216x^6$
35. $\frac{4xy}{7z^5}$	36. $\frac{27a^5c^{18}}{4b^{10}}$
37a. $-5^2=-25$ $\left(-5\right)^2=25$	37b. $-7^2=-49$ $\left(-7\right)^2=49$
38. $6\sqrt{5}$	39. $9c^2d^2\sqrt{2d}$
40. $2x^2y\sqrt{6}$	41. $3xy\sqrt[3]{2y^2}$

42. $\sqrt{7b}$	43. $\frac{3a\sqrt{2b}}{4b}$
44. $4\sqrt{3}$	45. $19\sqrt[3]{x^2}-3x$
46. $y-6\sqrt{y}+8$	47. $\frac{3-\sqrt{5}}{2}$
48. $-2-\sqrt{5}$	49. $y=\frac{1}{2}x-5$
50. $a)\,neither$ $b)\perp$ $c)\parallel$	51. $parallel \quad y=-2x-13$ $perpendicular \; y=\frac{1}{2}x-3$
52. $(-0.5, 0.5)$	53. $\left(\frac{39}{11}, -\frac{1}{11}\right)$
54. $(1,1)$	55. $a) \quad no$ $b) \quad yes$
56a. $D=\mathbb{R}$ $R=y\geq -4$	56b. $D=x>-4$ $R=y>-2$
57. $a)\ 33$ $b)\ 28$ $c)\ 5t^2-14t+9$ $d)\ 5h^2+10ah-4h$	58. $a)\ f(x)=\sqrt{x}$ $b)\ f(x)=\lvert x\rvert$ $c)\ f(x)=x^2$ $d)\ f(x)=x^3$
59. $x=4,-1$	60. $x=\frac{1}{2},-2$
61. $x=\frac{\pm\sqrt{15}}{5}$	62. $x=7,-1$