RBR ALGEBRA 1

FINAL EXAM STUDY GUIDE

SOLVING EQUATIONS

SOLVING SYSTEMS BY SUBSTITUTION

$$\begin{aligned} -2x + y &= -3 \\ 5x - 2y &= 4 \end{aligned}$$

$-2x + y = -3$

$y = 2x - 3$

1. Isolate one variable in terms of the other.

$5x - 2y = 4$

$5x - 2(2x - 3) = 4$

2. Replace "*y*" with its equivalent expression.

$5x - 4x + 6 = 4$

$x + 6 = 4$

$x = -2$

3. Solve for *x*.

$y = 2x - 3$

$y = 2(-2) - 3 = -7$

4. Plug the value of *x* into the original equation.

$(-2, -7)$

SOLVING SYSTEMS BY ELIMINATION

$$\begin{aligned} 3x - 9y &= 0 \\ 2x + 3y &= -12 \end{aligned}$$

$3x - 9y = 0$

$3(2x + 3y = -12)$

1. Multiply both sides of an equation to get a variable to eliminate.

$3x - 9y = 0$

$+\ 6x + 9y = -36$

$9x = -36$

$x = -4$

2. Add the equations to ***eliminate*** a variable.

3. Solve for *x*.

$2x + 3y = -12$

$2(-4) + 3y = -12$

$3y = -4$

$y = -4/3$

4. Plug the value of *x* into the original equation.

$(-4, -4/3)$

SOLVING INEQUALITIES WITH 1 VARIABLE

Example:

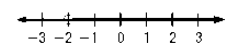
$-3x + 5 < 11$

$-3x + 5 < 11$

$-5 < -5$

$\frac{-3x}{-3} > \frac{6}{-3}$

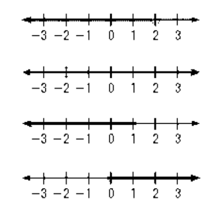
$x > -2$



The **graph** of a linear inequality in one variable is the set of points on a number line that represent all solutions of the inequality.

VERBAL PHRASE	INEQUALITY
All real numbers less than 2	$x < 2$
All real numbers greater than -2	$x > -2$
All real numbers less than or equal to 1	$x \le 1$
All real numbers greater than or equal to 0	$x \ge 0$

GRAPH



An open dot is used for < or > and a solid dot for ≤ or ≥.

Remember when dividing both sides of an inequality by a negative number, you must flip the inequality sign.

14 min

SOLVING ABSOLUTE VALUE EQUATIONS

Since the absolute value of a negative number or a positive number both result in a positive solution, there are usually **2 solutions** to absolute value equations.

Examples:

1. $|x| = -7$ No Solution! Absolute Value is always positive.
2. $|x+1| = 7$ Since both $|-7| = 7$ and $|7| = 7$

We write two equations to find what values of x will produce a 7 or -7.

$x + 1 = 7$ or $x + 1 = -7$

x = 6 or x = -8

Be sure to completely **isolate** the absolute value expression **before** writing the two separate equations.

SOLVING QUADRATICS

- An equation that has a variable raised to the 2nd power.
- Solve just like a linear equation – Just UNDO it!
- The square root of a number has a positive and negative solution.
- If the equation has an x^2 and an x term, it must be factored first and then the factors are set equal to zero.

Examples:

$x^2 - 50 = -1$ *Only an* x^2 *term, just isolate it!*

$x^2 = 49$

$x = 7, -7$ *Don't forget* $\sqrt{x^2}$ *can be positive or negative.*

$(x-3)^2 = 25$

$\sqrt{(x-3)^2} = \sqrt{25}$ *Easiest to square root both sides.*

$x - 3 = 5 \quad x - 3 = -5$ *Don't forget* $\sqrt{25}$ *can be positive or negative.*

$x = 8, -2$

14 min

FACTORING QUADRATIC S

Perfect Square Trinomials

$x^2 + 8x + 16$

$(x+4)(x+4)$

General Trinomial

$x^2 + 6x - 16$

$(x+8)(x-2)$

Difference of 2 Squares

$x^2 - 16$

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

Leading Coefficient >1

$3x^2 + 14x - 5$

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

**The 3 affects your middle term. Can't just ask, "what multiplies to -5 and adds to 14?"*

GCF

$2x^3 - 12x^2 + 18x$

$2x(x^2 - 6x + 9)$

$2x(x-3)(x-3)$

**Easier to divide each term by gcf before factoring further.*

RBR ALGEBRA 1

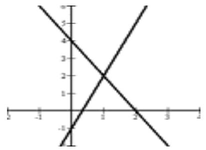
FINAL EXAM STUDY GUIDE

GRAPHS OF ALL TYPES

SOLVING SYSTEMS BY GRAPHING

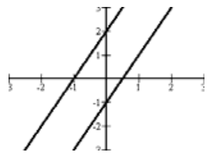
INTERSECTING LINES:

The point of intersection is the solution.
Solution: (1, 2)



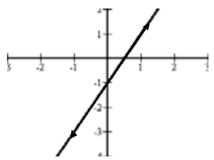
PARALLEL LINES:

Since these lines never intersect, there is **NO SOLUTION**



COINCIDING LINES:

Since the lines are on top of each other, there are
INFINATELY MANY SOLUTIONS

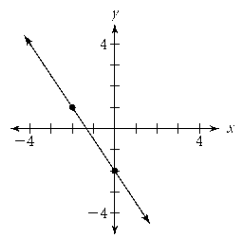


GRAPHING INEQUALITIES WITH 2 VARIABLES

Example:

$3x + 2y \le -4$

$y \le -3/2x - 2$



1. Isolate y, to get inequality into y-intercept form.
2. Graph just like a linear equation.
   $>, <$ graph with a dashed line
   $\ge \le$ graph with a solid line
3. Shade the region that satisfies the inequality.
4. Check a point to be sure that you have shaded the correct region.
   (Usually (0,0) is easiest to check).

$0 \le -3/2(0) - 2$

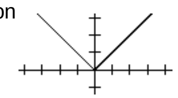
$0 \not\le -2$ Since (0,0) is not a solution, it should not be in the shaded region.

GRAPHING ABSOLUTE VALUE FUNCTIONS

Because both positive and negative *x*-values produce positive *y* values. The graph of the absolute value function produces two branches, forming a V.

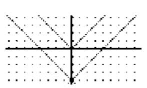
Parent Function

$f(x) = |x|$



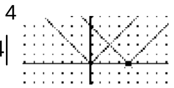
Shifts **down** 4

$f(x) = |x| - 4$



Shifts **right** 4

$f(x) = |x - 4|$



Flips to form ?

$f(x) = -|x|$

Slope increases to 2.
Graph becomes narrow.

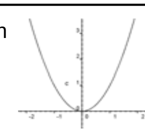
$f(x) = 2|x|$

GRAPHING QUADRATIC FUNCTIONS

When you multiply a positive or negative number to itself, the result is always positive. The graph of a quadratic function produces a parabola.

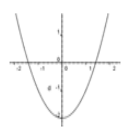
Parent Function

$f(x) = x^2$



Shifts **down** 2

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



Shifts **right** 2

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

Flips to form n

$f(x) = -x^2$

Slope increases to 2.
Graph becomes narrow.

$f(x) = 2x^2$

THINGS TO REMEMBER

Simplify Radicals

Remember	Examples
Remove all perfect square factors.	$\sqrt{50} = \sqrt{25}\left(\sqrt{2}\right) = 5\left(\sqrt{2}\right) = 5\sqrt{2}$
No radicals in the denominator.	$\frac{2}{\sqrt{3}} = \frac{2}{\sqrt{3}}\left(\frac{\sqrt{3}}{\sqrt{3}}\right) = \frac{2\sqrt{3}}{\sqrt{9}} = \frac{2\sqrt{3}}{3}$
No fractions under the radical sign	$\sqrt{\frac{3}{4}} = \frac{\sqrt{3}}{\sqrt{4}} = \frac{\sqrt{3}}{2}$
Add or Subtract – "Like" terms	$2\sqrt{3} - 2\sqrt{5} + 3\sqrt{5} - \sqrt{3} = \sqrt{3} + \sqrt{5}$
Multiply or Divide – Numbers in front together, then numbers under the radical sign together.	$\frac{4\sqrt{15}}{2\sqrt{5}} = \frac{4}{2}\left(\frac{\sqrt{15}}{\sqrt{5}}\right) = 2\sqrt{3}$ ALSO $2\sqrt{3}\left(5\sqrt{2}\right) = 10\sqrt{6}$

Functional Notation:

The $f(x)$ notation can be thought of as another way of representing the *y*-value in a function, especially when graphing. The *y*-axis is even labeled as the $f(x)$ axis, when graphing.

To evaluate a function, simply replace (substitute) the function's variable with the indicated number.

Example:

A function is represented by $f(x) = -5x^2 + 180$

A. Find $f(-3)$: $f(-3) = -5(-3)^2 + 180$ Replace the *x*-value with -3 & Evaluate

$f(-3) = -5(9) + 180$

$f(-3) = -45 + 180$

$f(-3) = 135$

B. Find *x*, *when* $f(x) = 0$: $0 = -5x^2 + 180$ Replace the *y*-value with 0 & Solve for

$-180 = -5x^2$ Subtract 180 from both sides.

$36 = x^2$ Divide both sides by -5 to isolate x^2

$\pm 6 = x$ Square root both sides.