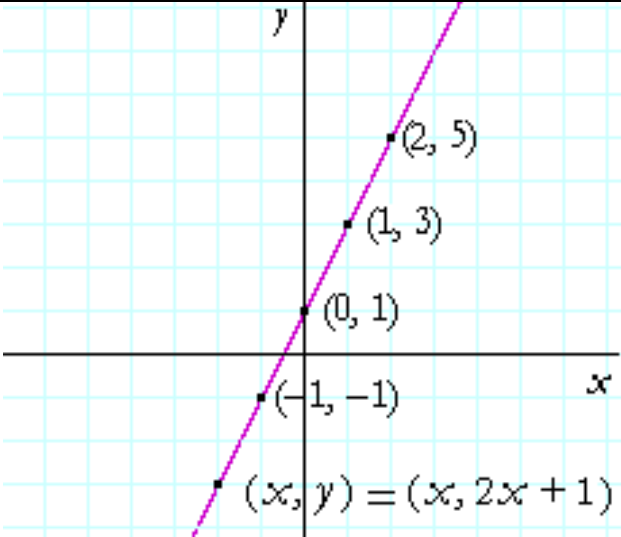





BasicsIII: Graphing

Study Guide pp 17-22; Anthony & Biggs pp 17-19

Topic	Interpretation															
<p>Graphs The graph of an equation in two variables is the set of points in the plane whose coordinates are solutions of the equation. <u>Example:</u> Sketch the graph of $y = 2x + 3$ Construct a table of y-values for a reasonable number of x-values:</p> <table border="1" data-bbox="232 1003 621 1245"> <thead> <tr> <th>x</th> <th>$y = 2x+1$</th> <th>(x,y)</th> </tr> </thead> <tbody> <tr> <td>-1</td> <td>-1</td> <td>(-1,-1)</td> </tr> <tr> <td>0</td> <td>1</td> <td>(0,1)</td> </tr> <tr> <td>1</td> <td>3</td> <td>(1,3)</td> </tr> <tr> <td>2</td> <td>5</td> <td>(2,5)</td> </tr> </tbody> </table>	x	$y = 2x+1$	(x,y)	-1	-1	(-1,-1)	0	1	(0,1)	1	3	(1,3)	2	5	(2,5)	 <p>x-intercept: \cap x-axis: $y = 0$ $2x + 1 = 0 \Rightarrow x = \frac{-1}{2} ; (\frac{-1}{2}, 0)$</p> <p>y-intercept: \cap y-axis : $x = 0$ $y = 2(0) + 1 = +1 ; (0, 1)$</p>
x	$y = 2x+1$	(x,y)														
-1	-1	(-1,-1)														
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2	5	(2,5)														
<p>Quadratic Curves $Y = ax^2 + bx + c$ $x = \frac{-b}{2a}$ is the axis of symmetry and the x-value of the vertex <u>Example:</u> the vertex of the Parabola : $Y = 2x^2 - 4x + 5$ $a = 2, b = -4$ and $c = 5$ $x = \frac{-b}{2a} = \frac{4}{4} = 1$ Substitute this in Y : $Y = 2(1)^2 - 4(1) + 5 = 3$ the vertex : $(1, 3)$</p>	 <p>$a > 0$ $a < 0$</p>															

Example:

Sketch the graph of

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

$$a=2, b=2, c=-4$$

1.) Vertex: $x = \frac{-b}{2a} =$

$$\frac{-2}{4} = \frac{-1}{2} \text{ Substitute this in } y :$$

$$y = \frac{-9}{2} \Rightarrow V\left(\frac{-1}{2}, \frac{-9}{2}\right)$$

2.) x-intercept : $y = 0$

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

$$(2x - 2)(x + 2) = 0$$

$$x = 1 \text{ or } x = -2$$

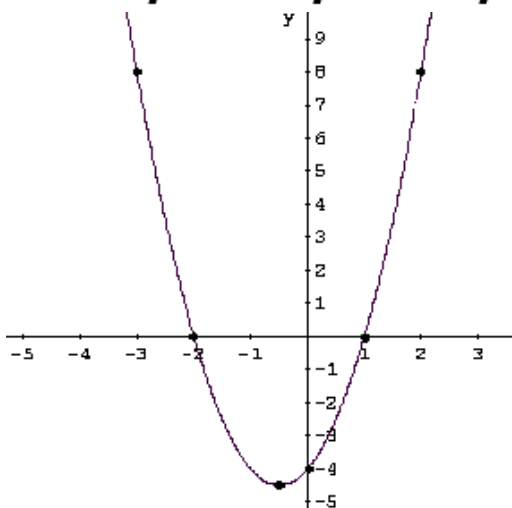
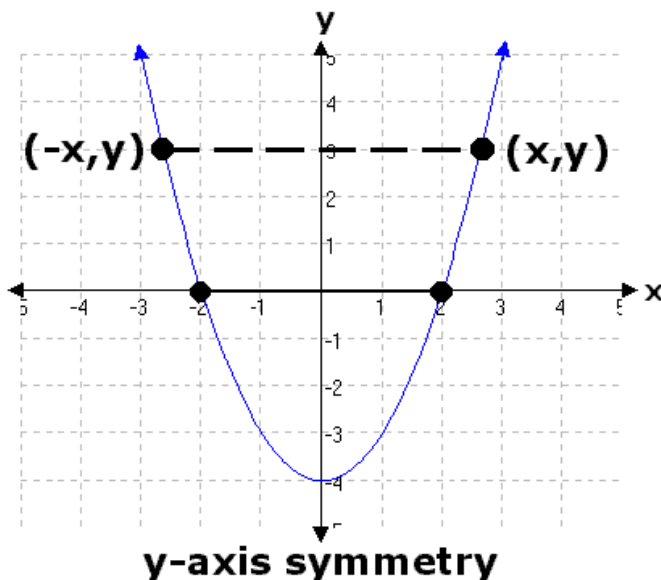
$$(1, 0) ; (-2, 0)$$

3.) y-intercept : $x = 0$

$$y = 2(0)^2 + 2(0) - 4 = -4$$

$$(0, -4)$$

In case where there are no x-intercepts, construct a table of y-values as in the first example.



Intersection points

Set $y = y$ and solve for x .

Example :

Let $f(x) = 4x^2 - 8x - 1$ and

$$g(x) = -4x^2 - 2x + 4$$

Determine the positive value of x at which these two graphs intersect.

(LSE 2004)

$$4x^2 - 8x - 1 = -4x^2 - 2x + 4$$

$$8x^2 - 6x - 5 = 0$$

$$a = 8, b = -6, c = -5$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{6 \pm \sqrt{36 + 160}}{16}$$

$$x = \frac{6 \pm \sqrt{196}}{16} = \frac{6 \pm 14}{16}$$

Either $x = \frac{6 - 14}{16} = \frac{-8}{16} = \frac{-1}{2}$

Or $x = \frac{6 + 14}{16} = \frac{20}{16} = \frac{5}{4} > 0$ which is

the required.