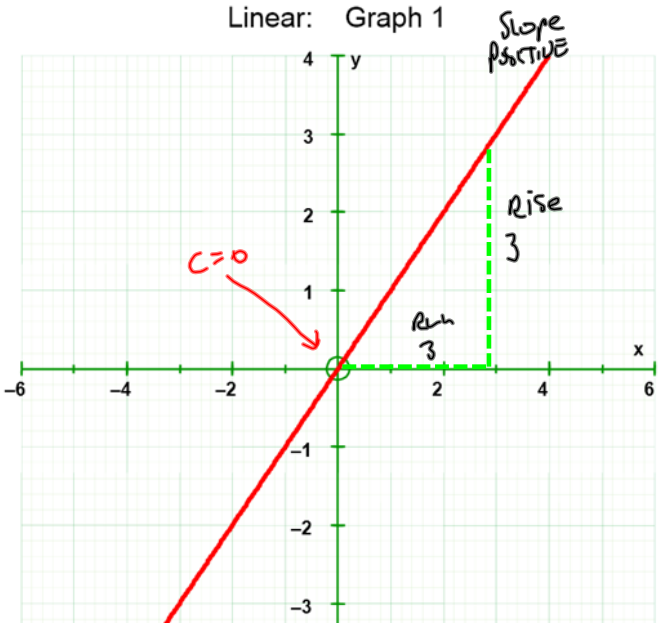
# Functions and Graphs

8-10-2012

Class Notes & Homework




What is the equation of this line?

$y = mx + c$

$m$ ↑ slope, $c$ ↑ y-intercept

$m = \frac{3}{3} = 1$

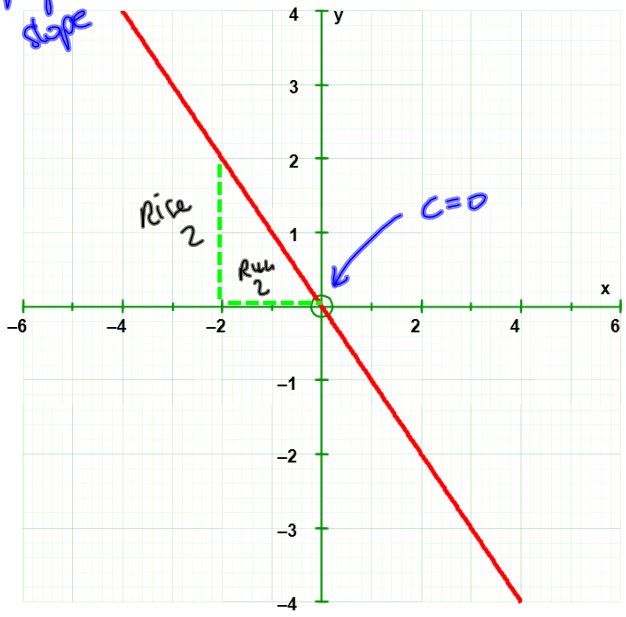
equation:

$y = 1x + 0$

$y = x$

(or $x - y = 0$)

Linear: Graph 2




$|m| = \frac{2}{2} = 1$

But since slope negative

$\Rightarrow m = -1$

equation:

$y = mx + c$

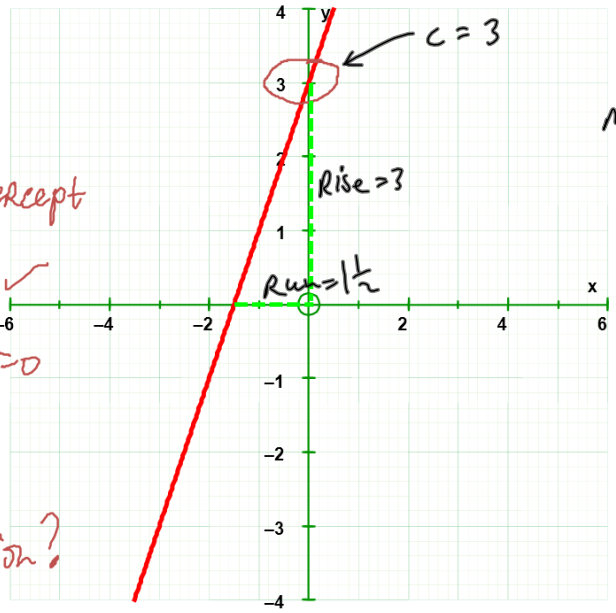
$y = -x + 0$

$y = -x$

(or $x + y = 0$)

$y - y_1 = m(x - x_1)$

Linear: Graph 3




$y = mx + c$

↑ y-intercept

$y = 2x + 3$ ✓

or $2x - y + 3 = 0$

$m = \frac{3}{1.5} = 2$

Equation?

equation?

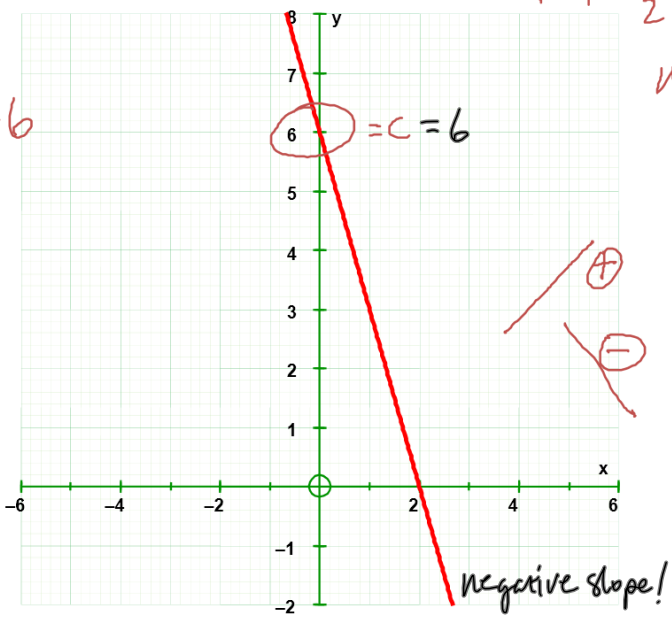
Linear: Graph 4

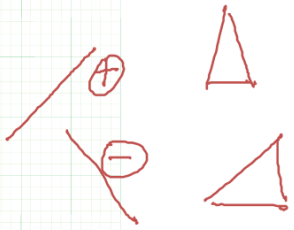
$|m| = \frac{6}{2} = 3$

$m = -3$

$y = -3x + 6$

$= c = 6$



Linear: Graph 5

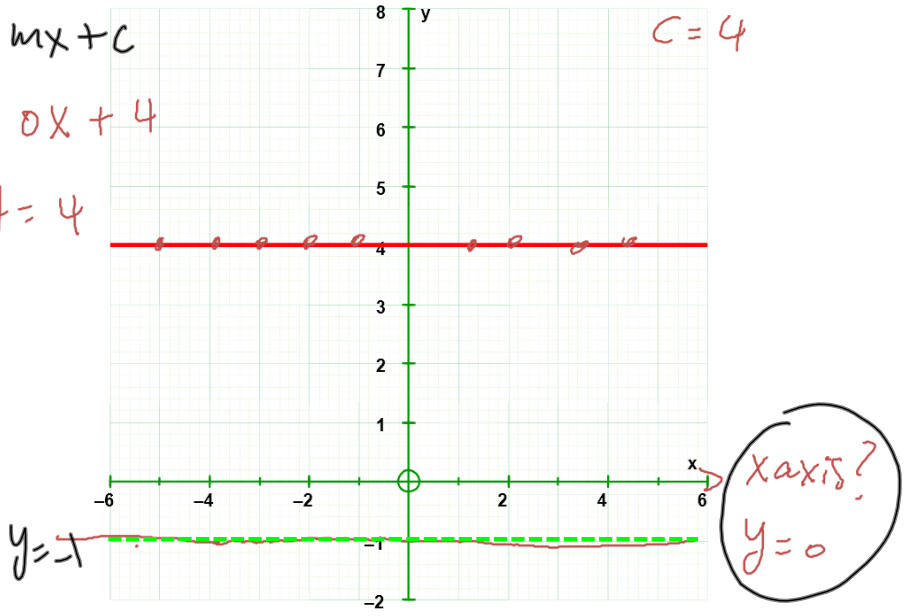
$m = 0$

$c = 4$

$y = mx + c$

$y = 0x + 4$

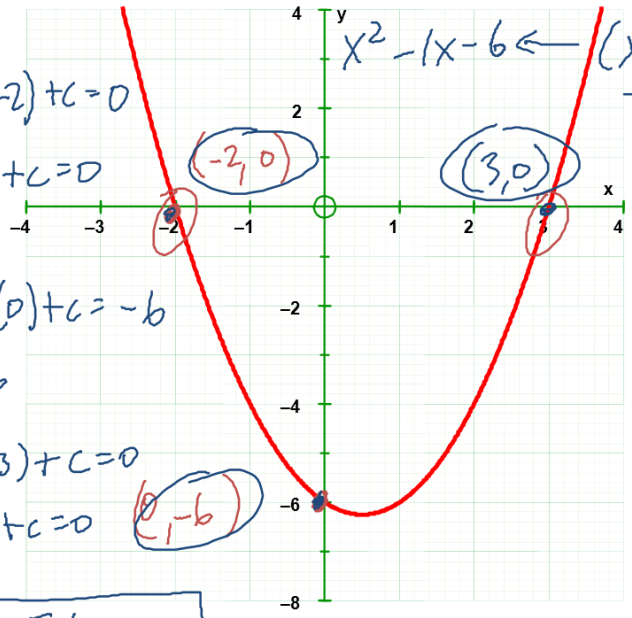
$y = 4$



equation

Quadratic: Graph 1

$ax^2+bx+c=0$




$x^2-1x-6 \Leftarrow (x+2)(x-3)=0$

$a(-2)^2+b(-2)+c=0$

$4a-2b+c=0$

$a(0)^2+b(0)+c=-6$

$\Rightarrow c=-6$

$a(3)^2+b(3)+c=0$

$9a+3b+c=0$

$1x^2-1x-6=0$

$9a+3b=6$

$3a+b=2$

$4a-2b=6$

$2a-b=3$

$2a-b=3$

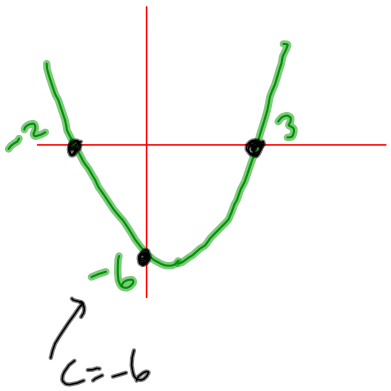
$3a+b=2$

$5a=5$

$a=1$

$b=2-3a=-1$

QUICKER WAY




| SOLUTION | → | FACTOR |
|---|---|---|
| $x=-2$ | → | $(x-2)$ |
| $x=3$ | → | $(x+3)$ |

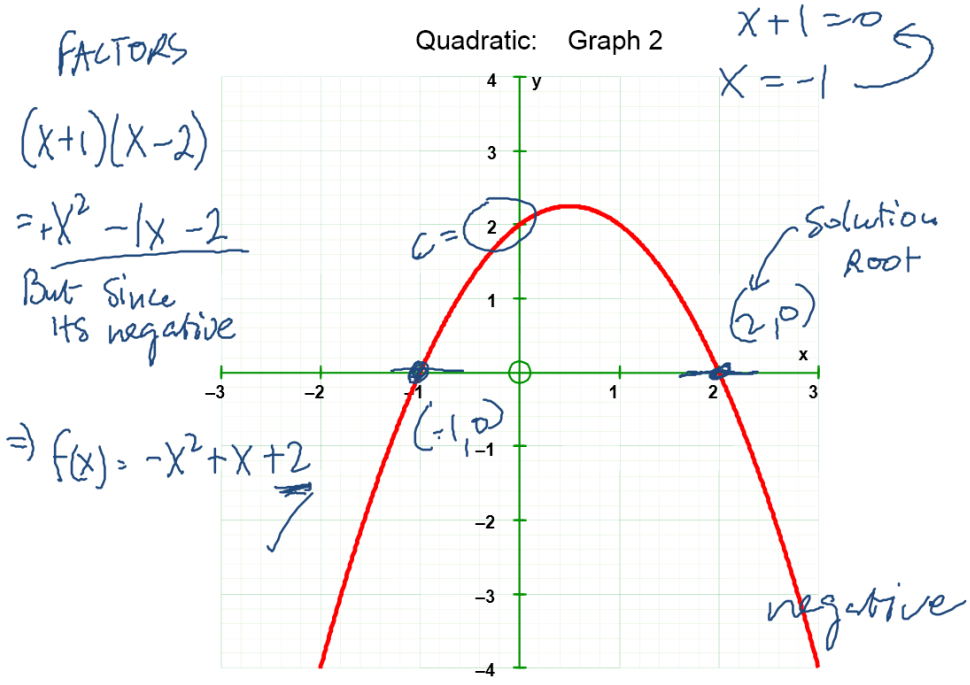
multiply $(x-2)(x+3)$

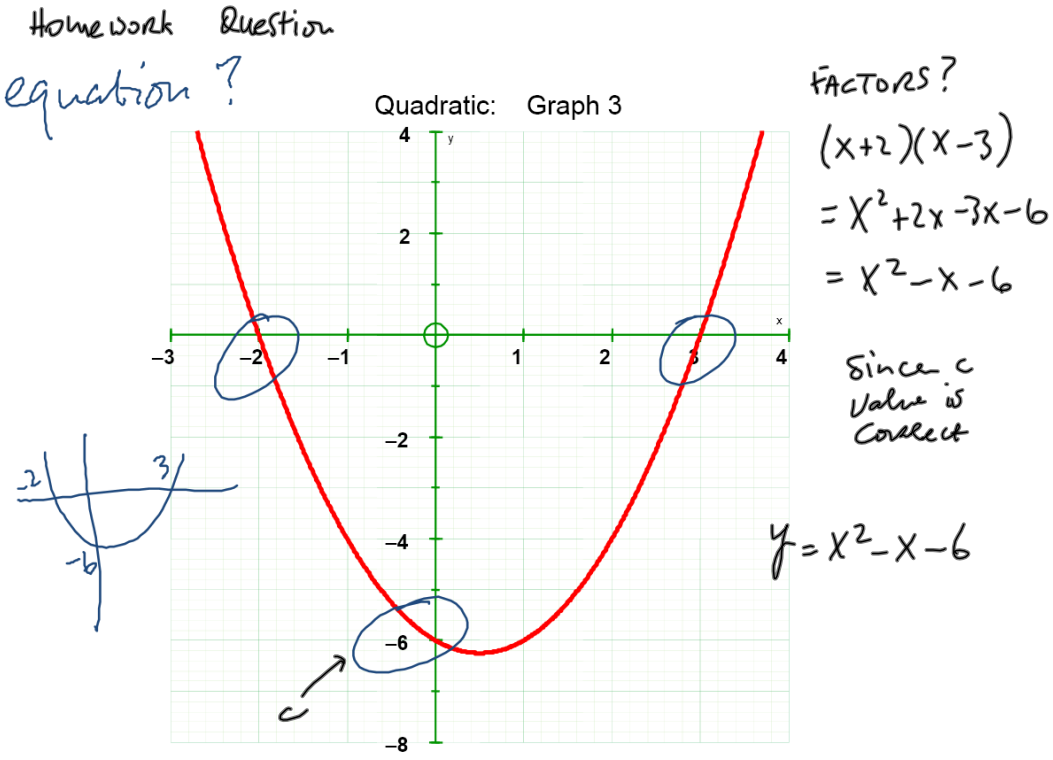
$x^2+3x-2x-6$

$x^2+x-6$

since c value is correct

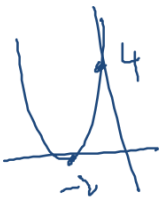
$\Rightarrow$ $y=x^2+x-6$ is equation

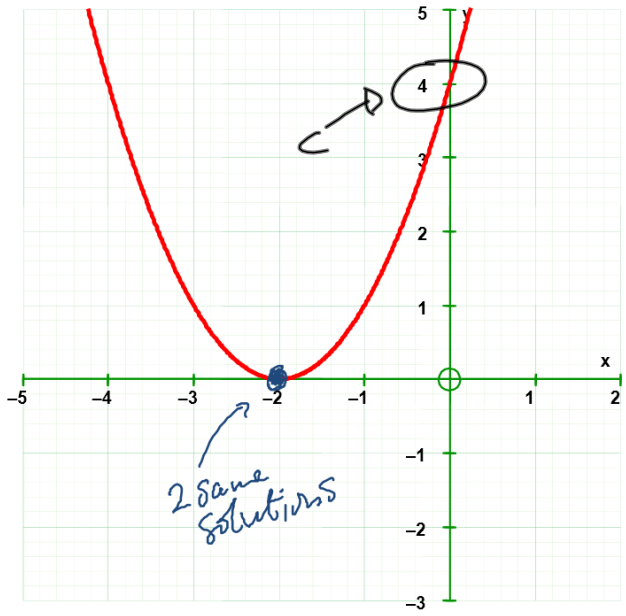

FACTORS
(x+1)(x-2)
=+x² -1x -2
But since its negative
⇒ f(x) = -x²+x+2
Quadratic: Graph 2
x+1=0
x=-1
c=2
Solution Root
(2,0)
(-1,0)
negative


Homework Question
equation ?
Quadratic: Graph 3
FACTORS?
(x+2)(x-3)
= x²+2x-3x-6
= x²-x-6
Since c Value is Correct
y = x²-x-6
-2
3
-6
c

Homework Question

Quadratic: Graph 4




FACTORS

$(x+2)(x+2)$

$= x^2 + 4x + 4$

c value matches equation

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

## Graph : $f(x) = x^3 - 6x^2 + 9x$

BASIC SHAPE

Turning points ?

$f'(x) = 3x^2 - 12x + 9 = 0$

$\Rightarrow \quad x^2 - 4x + 3 = 0$

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

$x = 1 \text{ or } 3$

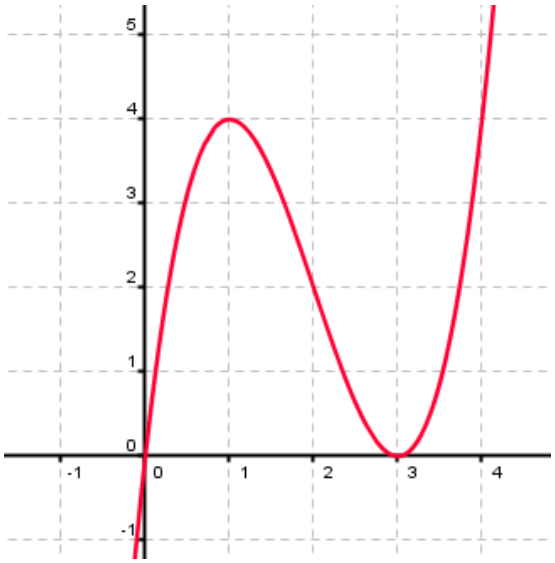
$f(1) = (1)^3 - 6(1)^2 + 9(1) = 4$

$f(3) = (3)^3 - 6(3)^2 + 9(3) = 0$

Turning points $(1,4)$ and $(3,0)$

Using Calculator Table function $\Rightarrow$

| $x$ | -1 | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|
| $f(x)$ | -16 | 0 | 4 | 2 | 0 | 4 | 20 |



Graph: $y = 2x^3 + 3x^2 - 12x$ BASIC SHAPE

Turning Points

$f'(x) = 6x^2 + 6x - 12 = 0$

$x^2 + x - 2 = 0$

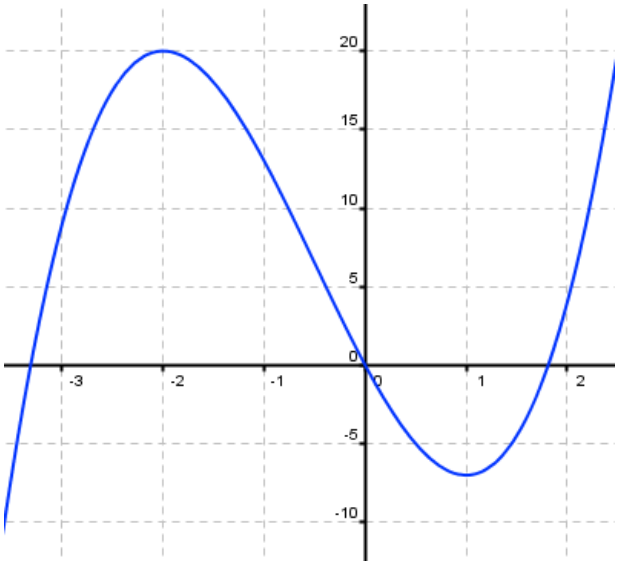
$(x+2)(x-1) = 0$

$x = -2$ or $1$

$f(-2) = 2(-2)^3 + 3(-2)^2 - 12(-2) = 20$

$f(1) = 2(1)^3 + 3(1)^2 - 12(1) = 13$

Turning points $(-2, 20)$ and $(1, 13)$

From calculator:

| $x$ | $-3$ | $-2$ | $-1$ | $0$ | $1$ | $2$ | $3$ |
|---|---|---|---|---|---|---|---|
| $f(x)$ | $9$ | $20$ | $13$ | $0$ | $-7$ | $4$ | $45$ |