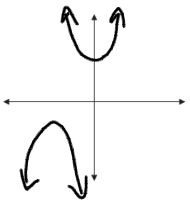
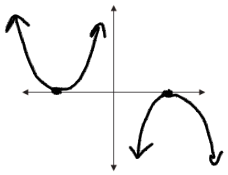
2.4 - Partial Factoring and Roots/Zeros

$y = a(x-s)(x-t)$ Desmos

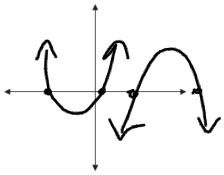
Finding the zeros/roots from a graph:



no zeros



one zero



two zeros

You can find the zeros by:
1. Factored Form
2. Quadratic Formula $\longrightarrow$ $x = \dfrac{-b \pm \sqrt{b^2-4ac}}{2a}$

Mar 1-10:39 PM

Eg 1 - Solve or Find the roots or Find the zeros

a) $(x-3)(x+4)=0$

$x=3, x=-4$

b) $y = x^2 + 7x - 30$

$y=(x+10)(x-3)$

$x=-10, x=3$

c) $y = 4x^2 - 9$

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

$x = \pm\frac{3}{2}$

d) $12x = -9x^2 - 4$

$9x^2+12x+4=0$

$(3x+2)(3x+2)=0$

$(3x+2)^2=0$

$x=-\frac{2}{3}$

M 36
A 12
N 9 9
6 6

e) $y = 3x^2 + 12$

$0=3(x^2+4)$

$x^2+4=0$

$x^2=-4$

$x=\sqrt{-4}$

NO SOLUTIONS!

No Roots

∴ NOT Possible

What does this mean?

Mar 1-11:00 PM

Eg 2 - Use the quadratic formula to solve

Exact answers only!!!

$y = ax^2 + bx + c$

a) $3x^2 + 4x - 2 = 0$ b)

$a = 3$, $b = 4$, $c = -2$

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

$= \frac{-4 \pm \sqrt{4^2 - 4(3)(-2)}}{2(3)}$

$= \frac{-4 \pm \sqrt{16 + 24}}{6}$

$= \frac{-4 \pm \sqrt{40}}{6}$

$= \frac{-4 \pm 2\sqrt{10}}{6}$

$= \frac{-4 + 2\sqrt{10}}{6}$

$= \frac{2(-2 + \sqrt{10})}{6}$

$= \frac{-2 + \sqrt{10}}{3}$ $= \frac{-2 - \sqrt{10}}{3}$

Mar 1-11:08 PM

b) $5x^2 - 3x + 2 = 0$

$a = 5$, $b = -3$, $c = 2$

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

$= \frac{3 \pm \sqrt{(-3)^2 - 4(5)(2)}}{2(5)}$

$= \frac{3 \pm \sqrt{9 - 40}}{10}$

$\therefore$ Not possible (no real roots)

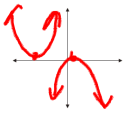
Mar 5-10:09 AM

The discriminant

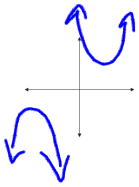
$D=b^2-4ac$ is the "discriminant", which is a number that tells us important information about the nature of the roots for a given equation. (Note: b^2-4ac is from the quadratic formula)

If D > 0 2 real roots

If D = 0 2 equal roots (one root)



If D < 0 no real roots



Why is this useful?

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Partial Factoring - finding 2 points at the same height $y=ax(x-s)+t$

Examples

a) $y=2x^2+10x+1$

$y=2x(x+5)+1$

$(0,1)$

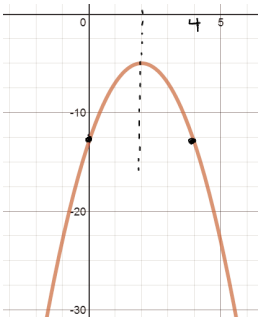
$(-5,1)$

b) $y=-2x^2+8x-13$

$=-2x(x-4)-13$

$x=0, y=-13$

$x=4, y=-13$



When you have these 2 points at the same height, you can use symmetry to find the vertex.

A.O.S.

- Add to x-values
- divide by two

Vertex

Sub A.O.S. and get y

Mar 1-11:19 PM

Homework

* 2.4 Handout (front and back some)

* p. 129 # 11aceg (if answers show "i" you should have written no real solution)

Over 90%	- 3
80-89	- 9
70-79	- 4
60-69	- 4
< 60	- 5

Top mark? 96%!

Mar 1-11:26 PM