

10/30/2023

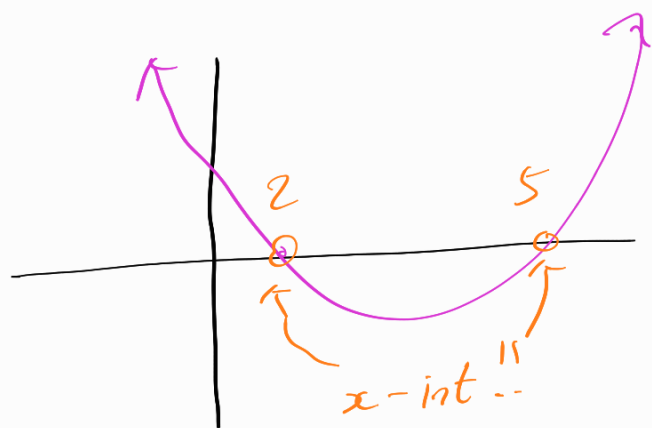
Last time $f(x) = ax^2 + bx + c$

$\Delta_f = \text{Discriminant of } f: b^2 - 4ac$

$\Delta = b^2 - 4ac > 0 \Rightarrow f$ is factorable
2 different factors

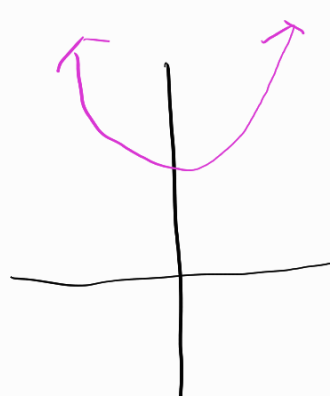
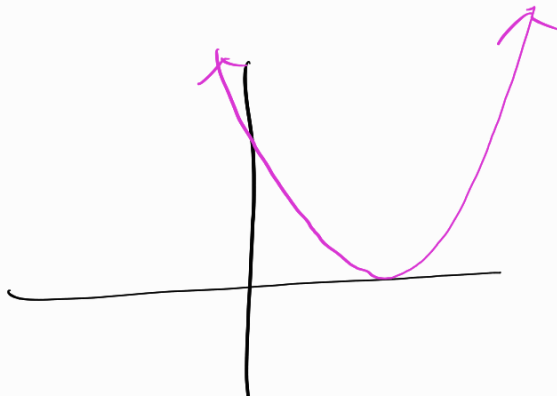
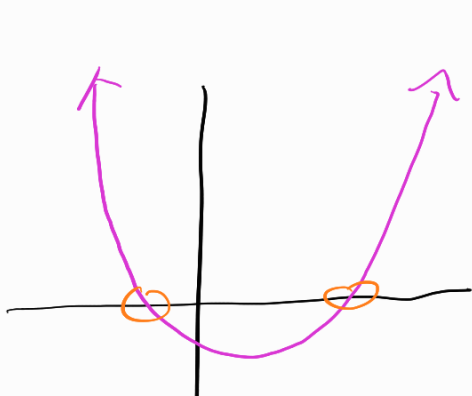
$\Delta = b^2 - 4ac = 0 \Rightarrow f$ is factorable
one (repeated) factor

$\Delta = b^2 - 4ac < 0 \Rightarrow f$ is not factorable



$f(x) = a \underline{(x-2)} \underline{(x-5)}$ ← 2 separate factors

$\Delta > 0 \dots$



2 x-int

1 x-int

0 x-int

$$\Delta > 0$$

$$\Delta = 0$$

$$\Delta < 0$$

Quadratic formula:

$$f(x) = ax^2 + bx + c = 0$$

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

use quad-formula to find x-int of

$$f(x) = \underset{\substack{\uparrow \\ a}}{2}x^2 + \underset{\substack{\uparrow \\ b}}{7}x - \underset{\substack{\uparrow \\ c}}{20} = 0$$

$$x = \frac{-7 \pm \sqrt{7^2 - 4(2)(-20)}}{2(2)}$$

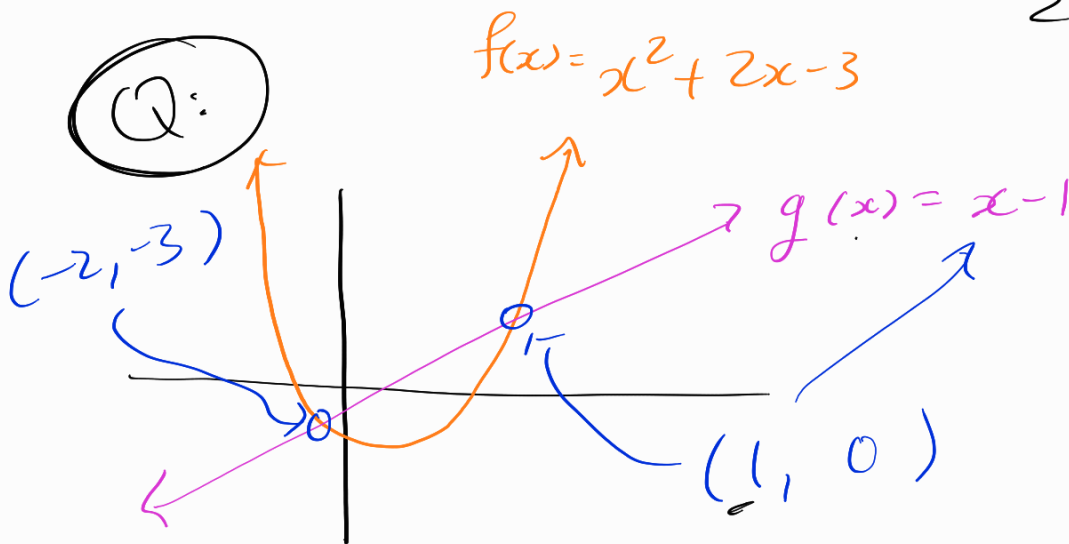
$$= \frac{-7 \pm \sqrt{49 - -160}}{4} = \frac{-7 \pm \sqrt{209}}{4}$$

$$x = \frac{-7 \pm \sqrt{209}}{4}$$

Find x-int of $f(x) = x^2 + x - 1$

$$b^2 - 4ac \stackrel{?}{=} 1 - 4(1)(-1) > 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-1 \pm \sqrt{5}}{2}$$
$$= \frac{-1 + \sqrt{5}}{2}, \frac{-1 - \sqrt{5}}{2}$$



Find the (pts) of intersection of f & g ...

$$\Rightarrow \underline{f(x)} = g(x)$$

$$x^2 + 2x - 3 = x - 1$$

$$\underline{-x + 1}$$

$$\underline{-x + 1}$$

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

$$\hookrightarrow x = \frac{-1 \pm \sqrt{1^2 - 4(1)(-2)}}{2}$$

Answers:

$(1, 0)$ and

$(-2, -3)$

$$= \frac{-1 \pm \sqrt{9}}{2} = \frac{-1+3}{2}, \frac{-1-3}{2}$$

$$\Rightarrow x = (1, -2)$$

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

Find the pts of intersection of

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

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

$$f(x) = g(x) \Rightarrow -x^2 + 3x + 9 = 2x - 3$$

$$\Rightarrow -x^2 + 1x + 12 = 0$$

Use quadratic formula

$$x = \frac{-1 \pm \sqrt{1^2 - 4(-1)(12)}}{2(-1)}$$

$$= \frac{-1 \pm \sqrt{1+48}}{-2}$$

$$= \frac{-1 \pm 7}{-2}$$

$$x = \frac{-1-7}{-2}, \frac{-1+7}{-2}$$

$$\hookrightarrow 4, -3$$

$$(4, 5)$$

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

$$(-3, -9)$$

$$2(-3) - 3 = -9$$