

Writing Project 2

$$f(x) = x^2 + x - 6$$

$$= x^2 + x + \left(\frac{1}{2}\right)^2 - 6 - \frac{1}{4}$$

$$-\frac{6 \cdot 4}{4} - \frac{1}{4} = -\frac{25}{4}$$

$$\frac{1}{2} \rightarrow \left(\frac{1}{2}\right)^2 = \frac{1}{4}$$

$$= \left(x + \frac{1}{2}\right)^2 - \frac{25}{4}$$

$$(h, k) = \left(-\frac{1}{2}, -\frac{25}{4}\right)$$

up

x-inter:

$$\left(x + \frac{1}{2}\right)^2 - \frac{25}{4} \stackrel{\text{SET}}{=} 0$$

$$\left(x + \frac{1}{2}\right)^2 = \frac{25}{4}$$

optional  $\left\{ \sqrt{\left(x + \frac{1}{2}\right)^2} = \sqrt{\frac{25}{4}} = \frac{\sqrt{25}}{\sqrt{4}} = \frac{5}{2} \right.$

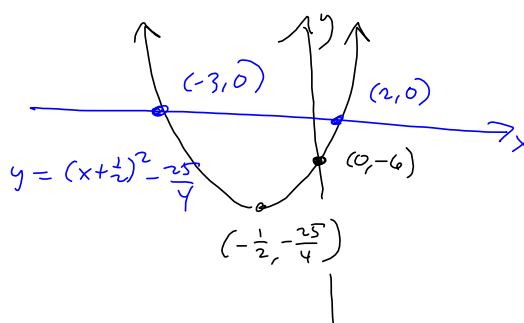
$$\left|x + \frac{1}{2}\right| = \frac{5}{2}$$

$$x + \frac{1}{2} = \pm \frac{5}{2}$$

$$x = -\frac{1}{2} \pm \frac{5}{2}$$

$$\rightarrow \frac{-1+5}{2} = \frac{4}{2} = 2 \rightsquigarrow (2, 0)$$

$$\rightarrow \frac{-1-5}{2} = \frac{-6}{2} = -3 \rightsquigarrow (-3, 0)$$



step-by-step graph, by transformations

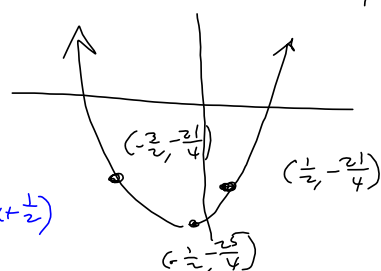
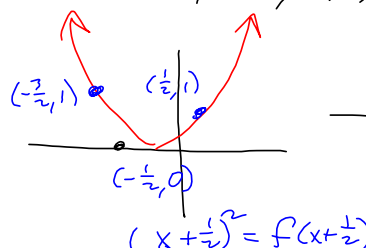
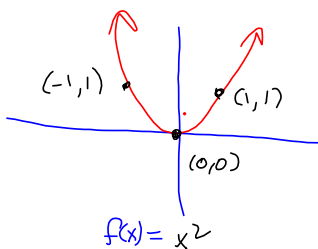
$$g(x) = \left(x + \frac{1}{2}\right)^2 - \frac{25}{4}$$

①  $x^2$

②  $\left(x + \frac{1}{2}\right)^2$  Left  $\frac{1}{2}$

③  $\left(x + \frac{1}{2}\right)^2 - \frac{25}{4}$  Down  $\frac{25}{4}$

Track: (0,0), (-1,1), (1,1)



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

$$-1 - \frac{1}{2}$$

$$1 - \frac{25}{4} = \frac{4-25}{4} = -\frac{21}{4}$$

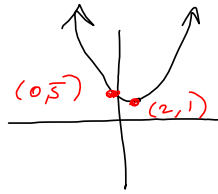
$$g(x) = x^2 - 4x + 5$$

$$= x^2 - 4x + 2^2 + 5 - 4$$

$$= (x-2)^2 + 1 \quad \underline{\text{SET } = 0}$$

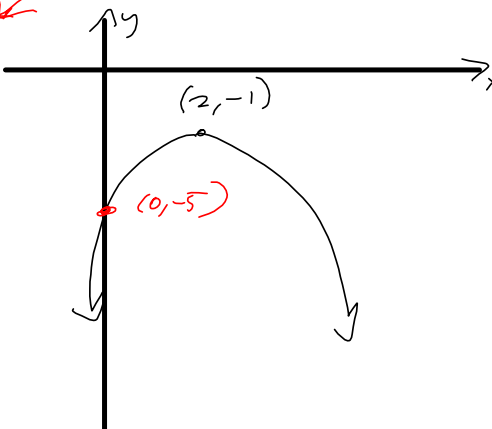
$$\Rightarrow (x-2)^2 = -1$$

No real  
zeros  
No x-intercepts



$$g(x) = -x^2 + 4x - 5$$

Subtracted 4      Added 4

$$= -(x^2 - 4x + 2^2) - 5 + 4$$
$$\frac{4}{2} = 2 \rightarrow 2^2 = 4$$
$$= -(x-2)^2 - 1$$


The graph shows a coordinate plane with x and y axes. A downward-opening parabola is plotted. The vertex is marked with a red dot at the point (2, -1). The y-intercept is marked with a red dot at the point (0, -5). The parabola passes through these two points and opens downwards.

$$g(x) = x^2 - 6x + 7$$

$$= x^2 - 6x + 3^2 + 7 - 9$$

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

$$\text{SET } 0 \Rightarrow$$

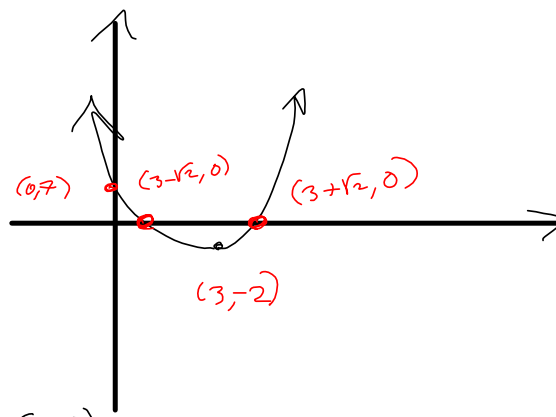
$$(x-3)^2 - 2 = 0$$

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

$$x-3 = \pm\sqrt{2}$$

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

$$\begin{array}{l} \nearrow (3+\sqrt{2}, 0) \\ \searrow (3-\sqrt{2}, 0) \end{array}$$



$$g(x) = 9x^2 - 42x + 38$$

$$\frac{42}{9} = \frac{14}{3}$$

$$= 9\left(x^2 - \frac{14}{3}x + \left(\frac{7}{3}\right)^2\right) + 38 - 49$$

$$\frac{\frac{14}{3}}{2} = \frac{14}{3} \cdot \frac{1}{2} = \frac{7}{3} \rightarrow \left(\frac{7}{3}\right)^2 = \frac{49}{9}$$

→ Adding  $9\left(\frac{7}{3}\right)^2 = 9\left(\frac{49}{9}\right) = 49$   
So, Subtract 49!

$$= 9\left(x - \frac{7}{3}\right)^2 - 11 \quad \underline{\underline{\text{SET } 0}}$$

$$9\left(x - \frac{7}{3}\right)^2 = 11$$

$$\left(x - \frac{7}{3}\right)^2 = \frac{11}{9}$$

$$x - \frac{7}{3} = \pm \frac{\sqrt{11}}{3}$$

$$x = \frac{7}{3} \pm \frac{\sqrt{11}}{3} = \frac{7 \pm \sqrt{11}}{3} \rightarrow \begin{cases} \frac{7 + \sqrt{11}}{3} \\ \frac{7 - \sqrt{11}}{3} \end{cases}$$

