Writing Project 2

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

$= x^2 + x + \left(\frac{1}{2}\right)^2 - 6 - \frac{1}{4}$ $\qquad \frac{-6 \cdot 4}{4} - \frac{1}{4} = \frac{-25}{4}$

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

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

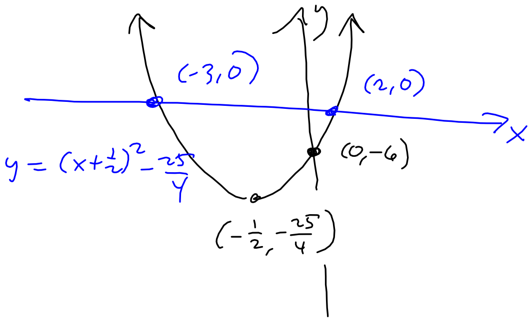
$(h, k) = \left(-\frac{1}{2}, -\frac{25}{4}\right)$

up

x-int:

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

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



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

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

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

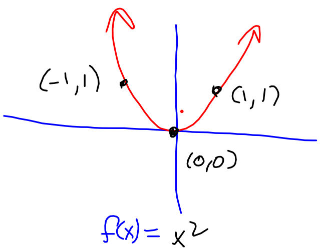
$\frac{-1+5}{2} = \frac{4}{2} = 2 \rightsquigarrow (2, 0)$

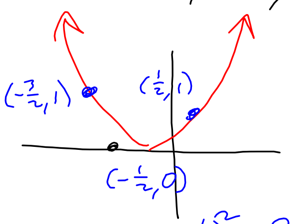
$\frac{-1-5}{2} = \frac{-6}{2} = -3 \rightsquigarrow (-3, 0)$

step-by-step graph, by transformations. $g(x) = \left(x + \frac{1}{2}\right)^2 - \frac{25}{4}$

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

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

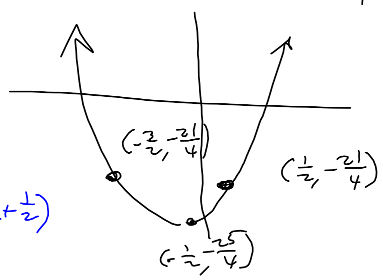




$\left(x + \frac{1}{2}\right)^2 = f\left(x + \frac{1}{2}\right)$

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

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



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

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

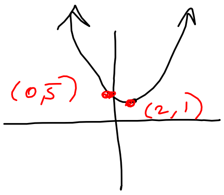
$= x^2 - 4x + 2^2 + 5 - 4$

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

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

No real zeros

No x-ints.



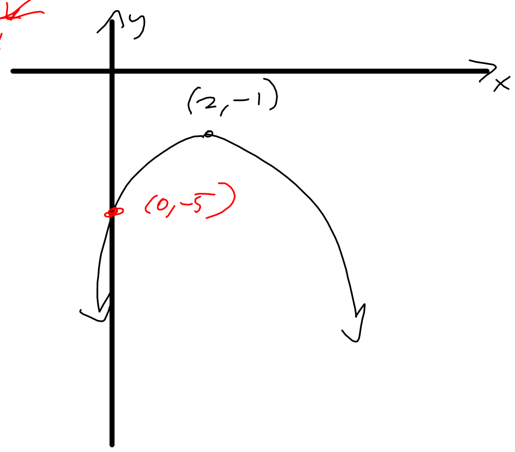
$g(x) = -x^2 + 4x - 5$

subtracted 4 Added 4

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

$\frac{4}{2} = 2 \rightsquigarrow 2^2 = 4$

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



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

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

$= \boxed{(x-3)^2 - 2}$

SET $= 0 \implies$

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

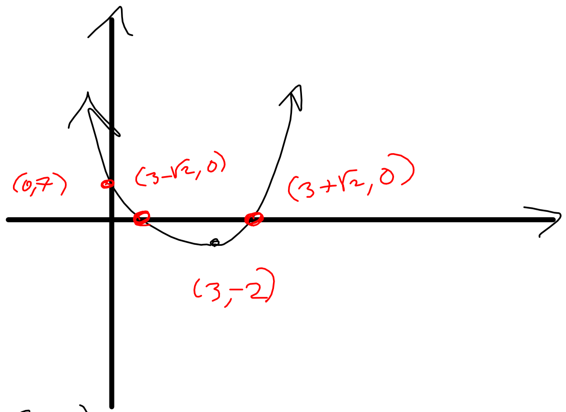
$(x-3)^2 = 2$

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

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

$(3+\sqrt{2}, 0)$

$(3-\sqrt{2}, 0)$



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

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

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

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

Adding $9\left(\frac{7}{3}\right)^2 = 9\left(\frac{49}{9}\right) = 49$

So, Subtract 49!

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

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

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

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

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

$\frac{7+\sqrt{11}}{3}$

$\frac{7-\sqrt{11}}{3}$