121 - Online

WRITING PROJECT #1

1. $x^2+5x-36=0$

$(x+9)(x-4)=0$

$x=-9$ OR $x=4$

$x \in \{-9, 4\}$

$x^2+5x \quad = 36$

$x^2+5x+\left(\frac{5}{2}\right)^2 = 36+\frac{25}{4} = \frac{144+25}{4} = \frac{169}{4}$

$\left(x+\frac{5}{2}\right)^2 = \frac{169}{4}$

optional steps

$\sqrt{\left(x+\frac{5}{2}\right)^2} = \sqrt{\frac{169}{4}}$

$\left|x+\frac{5}{2}\right| = \frac{13}{2}$

$x+\frac{5}{2} = \pm\frac{13}{2}$

$x = \frac{-5\pm 13}{2}$ → $\frac{8}{2}=4$, $-\frac{18}{2}=-9$

$x \in \{-9, 4\}$

$a=1, b=5, c=-36$

$b^2-4ac = 5^2-4(1)(-36)$

$= 25+144 = 169$

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

$= \frac{-5\pm\sqrt{169}}{2(1)}$

$= \frac{-5\pm 13}{2}$ → $\frac{8}{2}=4$, $-\frac{18}{2}=-9$

$\boxed{x \in \{-9, 4\}}$

121 ONLINE WP #1

(2) $10x^2+11x-6=0$

FACTORING

$10(-6)=-60$

$-60=10(-6)$

$=5(-12)$

$=15(-4) \leftarrow 15-4=11$ ✓

$10x^2+15x-4x-6=0$

$5x(2x+3)-2(2x+3)=0$

$(2x+3)(5x-2)=0$

$2x+3=0$ OR $5x-2=0$

$2x=-3$ $\quad 5x=2$

$x=-\frac{3}{2}$ $\quad x=\frac{2}{5}$

$x \in \{-\frac{3}{2}, \frac{2}{5}\}$

CTS:

$10(x^2+\frac{11}{10}x \quad)=6$

$10(x^2+\frac{11}{10}x+(\frac{11}{20})^2)=6+10(\frac{121}{400})$

$10(x+\frac{11}{20})^2=\frac{6}{1}(\frac{40}{40})+\frac{121}{40}$

$10(x+\frac{11}{20})^2=\frac{240+121}{40}=\frac{361}{40}$

$(x+\frac{11}{20})^2=\frac{361}{400}$

$x+\frac{11}{20}=\pm\sqrt{\frac{361}{400}}=\pm\frac{19}{20}$

$x=\frac{-11\pm19}{20}$ $\nearrow \frac{8}{20}=\frac{2}{5}$ $\searrow \frac{-30}{20}=-\frac{3}{2}$

$x \in \{-\frac{3}{2}, \frac{2}{5}\}$

QF:

$a=10, b=11, c=-6$

$b^2-4ac=11^2-4(10)(-6)$

$=121+240=361$

$x=\frac{-11\pm\sqrt{361}}{2(10)}=\frac{-11\pm19}{20}$

$\swarrow \frac{8}{20}=\frac{2}{5}$ $\searrow \frac{-30}{20}=-\frac{3}{2}$

$x \in \{-\frac{3}{2}, \frac{2}{5}\}$

121 ONLINE WP #1

(3) $x^2 - 8x - 10 = 0$

QF:

$a=1,\ b=-8,\ c=-10$

$b^2-4ac = (-8)^2 - 4(1)(-10)$

$= 64 + 40 = 104$

$$\begin{array}{r|l} 2 & 104 \\ 2 & 52 \\ 2 & 26 \\ & 3 \end{array}$$

So, $\sqrt{104} = 2\sqrt{26}$

$x = \dfrac{8 \pm 2\sqrt{26}}{2(1)} =$

$= \dfrac{2(4 \pm \sqrt{26})}{2}$

$= 4 \pm \sqrt{26}$

$x \in \{4-\sqrt{26},\ 4+\sqrt{26}\}$

CTS:

$x^2 - 8x \quad = 10$

$x^2 - 8x + 4^2 = 10 + 16$

$(x-4)^2 = 26$

$x - 4 = \pm\sqrt{26}$

$x = 4 \pm \sqrt{26}$

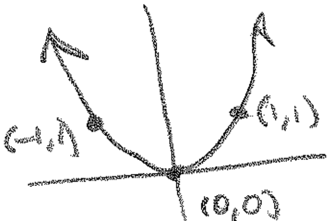
$x \in \{4-\sqrt{26},\ 4+\sqrt{26}\}$

Here's one where completing the square is the most efficient.

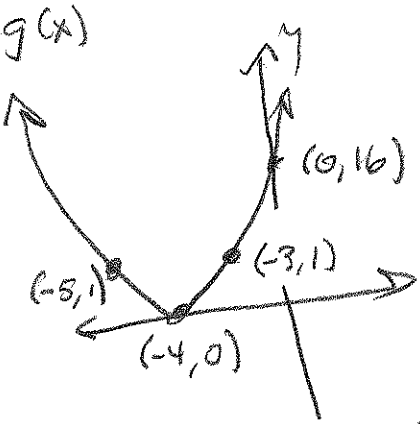
121 ONLINE WP #2

(1) $x^2+8x+16=g(x)$

$=(x+4)^2$



$f(x)=x^2$



$g(x)=f(x+4)=(x+4)^2$

There's an arithmetic error, here.
Will re-scan corrected solutions.

(2) $h(x)=3x^2-2x-5$

$=3(x^2-\frac{2}{3}x\quad)-5$

$=3(x^2-\frac{2}{3}x+(\frac{1}{3})^2)-5-3(\frac{1}{3})^2$

$=3(x-\frac{1}{3})^2-5-3(\frac{1}{9})=3(x$

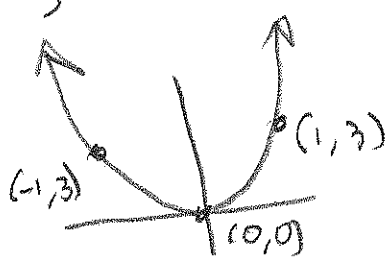
$=3(x-\frac{1}{3})^2-\frac{14}{3}$

SCRATCH:
$-5-\frac{1}{3}=\frac{15-1}{3}=\frac{14}{3}$

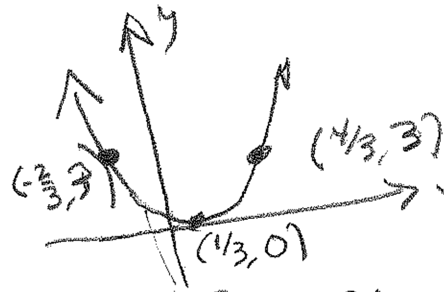
RIGHT $\frac{1}{3}$: $-1+\frac{1}{3}=\frac{-3+1}{3}=\frac{-2}{3}$

$1+\frac{1}{3}=\frac{4}{3}$

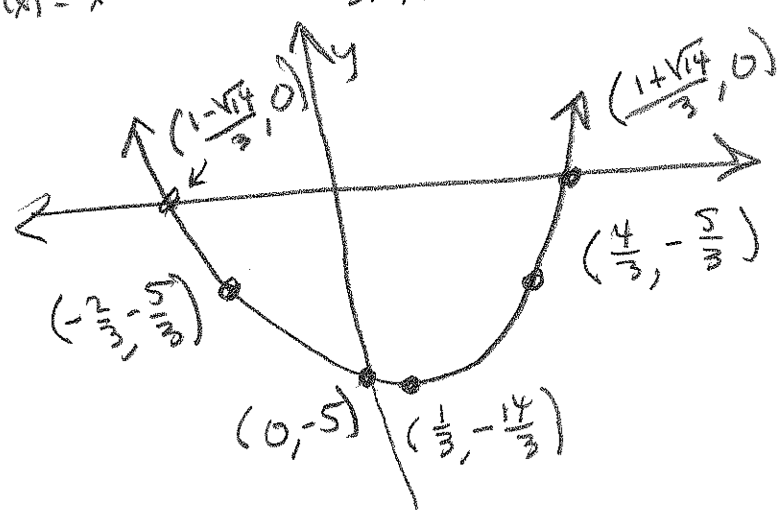
$f(x)=x^2$



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



$3(x-\frac{1}{3})^2=3f(x-\frac{1}{3})$



$3-\frac{14}{3}=\frac{9-14}{3}=\frac{-5}{3}$

x-int:

$3(x-\frac{1}{3})^2-\frac{14}{3}=0$

$3(x-\frac{1}{3})^2=\frac{14}{3}$

$(x-\frac{1}{3})^2=\frac{14}{9}$

$x-\frac{1}{3}=\pm\frac{\sqrt{14}}{3}$

$x=\frac{1\pm\sqrt{14}}{3}$

121 ONLINE WP #2

3. $w(x) = -x^2 + 8x - 15$

$= -(x^2 - 8x \quad) - 15$

$= -(x^2 - 8x + 4^2) - 15 + 16$

-16

$= \boxed{-(x-4)^2 + 1}$

$x^2, \ -x^2, \ -(x-4)^2, \ -(x-4)^2 + 1$

SET $= 0 \Longrightarrow$

$-(x-4)^2 + 1 = 0$

$-(x-4)^2 = -1$

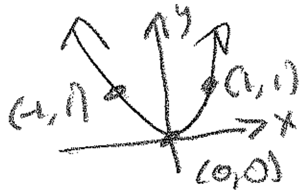
$(x-4)^2 = 1$

$x - 4 = \pm 1$

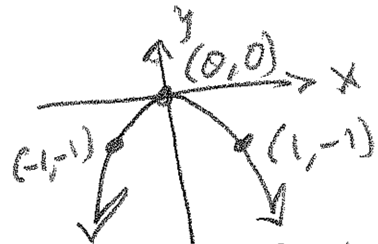
$x = 4 \pm 1$

$x \in \{3, 5\}$
FOR x-intercepts

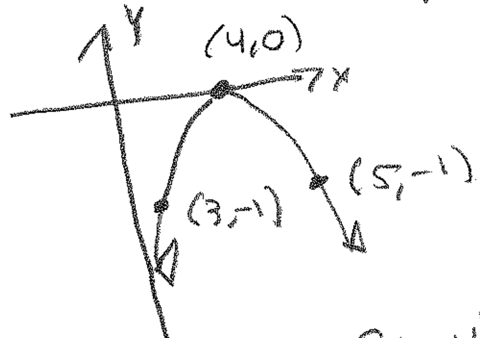
$w(0) = -15$
FOR y-intercept



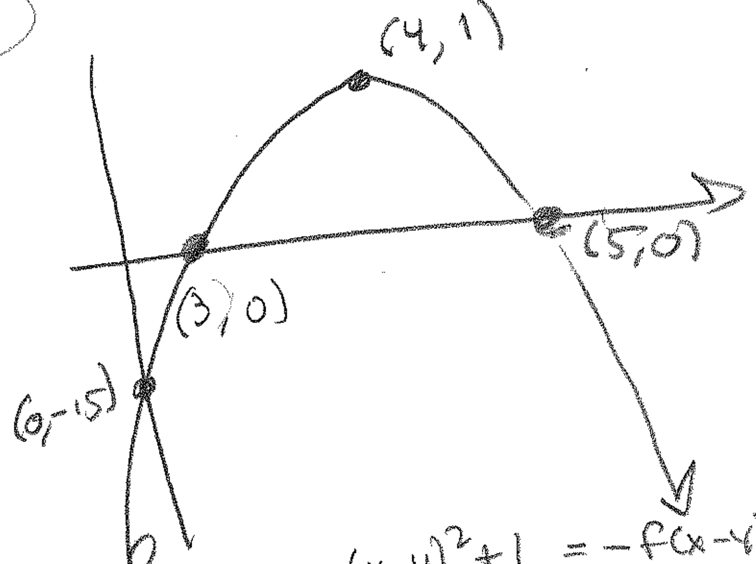
$f(x) = x^2$



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



$-(x-4)^2 = -f(x-4)$



$-(x-4)^2 + 1 = -f(x-4) + 1 = w(x)$