Sketching general form by completing the square

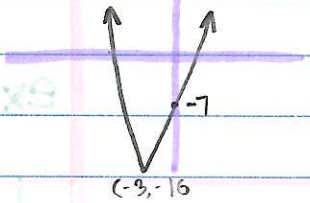
example: $f(x) = x^2 + 6x - 7$

$f(0) = 0^2 + 6(0) - 7 = -7$

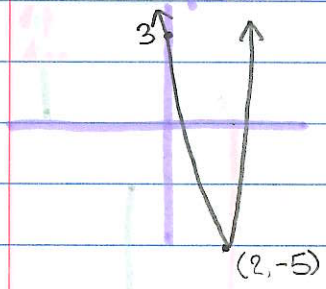
	x	3
x	x^2	$3x$
3	$3x$	9

$-9, -7$

$= (x+3)^2(-9) + (-7) \rightarrow (x+3)^2 - 16$



example 2: $f(x) = 2x^2 - 8x + 3 \rightarrow 2(x^2 - 4x + \frac{3}{2})$



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

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

	x	-2
x	x^2	$-2x$
-2	$-2x$	4

$-4 + \frac{3}{2}$ $\quad -\frac{8}{2} + \frac{3}{2} = -\frac{5}{2}$

vertex = (2, -5)

$f(0) = 2(0)^2 - 8(0) + 3 = 3$ (y-intercept

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

$f(0) = 1$

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

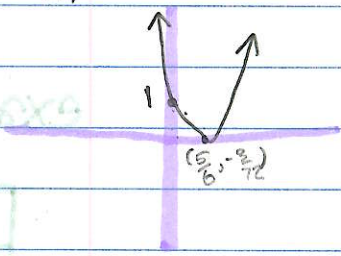
$\frac{5}{2} \cdot \frac{2}{3} = \frac{10}{6} \rightarrow \frac{5}{3}$ $\quad 1 \cdot \frac{2}{3} = \frac{2}{3}$

	x	$-\frac{5}{6}$
x	x^2	$-\frac{5}{6}x$
$-\frac{5}{6}$	$-\frac{5}{6}x$	$+\frac{25}{36}$

$-\frac{25}{36} + \frac{24}{36} = -\frac{1}{36}$

$-\frac{25}{36} + \frac{2 \cdot 12}{3 \cdot 12} \rightarrow \frac{3}{2}(x - \frac{5}{6})^2 - \frac{1}{36} = \frac{3}{2}(x - \frac{5}{6}) = \frac{3}{72}$

$(x - \frac{5}{6})^2 - \frac{1}{36}$



$y(0) = 1$ $\quad V = (\frac{5}{6}, -\frac{3}{72})$

Hilroy