Sec. 4.2 Standard Form of a Quadratic Function

Standard Form: $f(x) = ax^2 + bx + c$, $a \neq 0$

Properties: Graph is a parabola

- $a > 0$ opens up, $a < 0$ opens down
- axis of symmetry: $x = -\frac{b}{2a}$ $(x = h)$
- vertex: $\left(-\frac{b}{2a}, f\left(-\frac{b}{2a}\right)\right)$
- y-intercept: c

Problem 1: What are the vertex, the axis of symmetry, maximum or minimum value, and range of $y = -x^2 + 6x + 3$?

vertex: $\left(-\frac{b}{2a}, f\left(-\frac{b}{2a}\right)\right)$ $a = -1$ $b = 6$ $c = 3$

D: ARN

R: $y \leq 12$

$\frac{-6}{2(-1)} = \frac{-6}{-2} = 3$

$y = -(3)^2 + 6(3) + 3$
$= -9 + 18 + 3 = 9 + 3$
$= 12$

$(3, 12)$

aos: $x = 3$ max/min: 12 $a = -1 < 0$

Problem 2: What is the graph of $y = 4x^2 - 16x + 10$?

V: $(2, -6)$ aos: $x = 2$

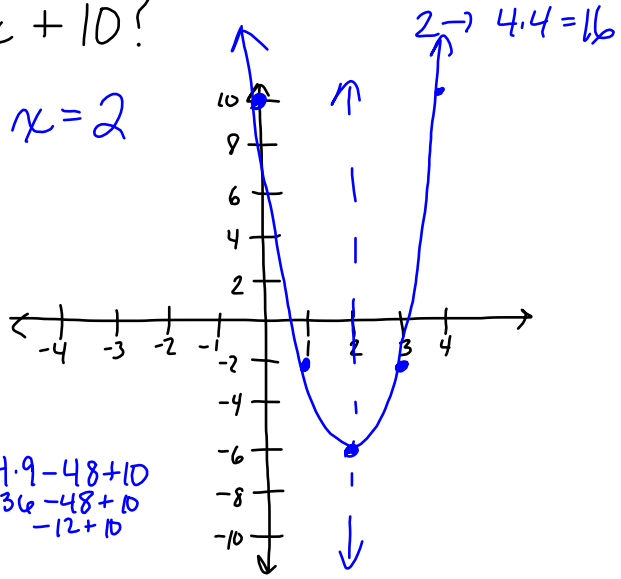
$-\frac{b}{2a} = \frac{16}{8} = 2$

$4(2)^2 - 16(2) + 10$
$4 \cdot 4$
$16 - 32 + 10$
-6

$c = 10$

x	y
3	-2

$4 \cdot 9 - 48 + 10$
$36 - 48 + 10$
$-12 + 10$



Problem 3: What is the vertex form of $y = 2x^2 + 3x + 2$? $y = a(x-h)^2 + k$

$-\frac{b}{2a} = -\frac{3}{4}$ V: $(-\frac{3}{4}, \frac{7}{8})$ $a = 2$

$y = 2(-\frac{3}{4})^2 + 3(-\frac{3}{4}) + 2$ $y = 2(x+\frac{3}{4})^2 + \frac{7}{8}$

$2(\frac{9}{16}) - \frac{9}{4}\cdot\frac{3}{2} + 2$

$\frac{9}{8} - \frac{18}{8} + \frac{16}{8} = \frac{-9+16}{8} = \frac{7}{8}$

Problem 4: A model for the performance of a stock is $P = -3d^2 + 50d$, where d represents the days of trading and P is the price per share. What is the maximum price per share of the stock?

V: (h, k) V: $(\frac{25}{3}, \frac{625}{3})$ $208.33

$-\frac{b}{2a} = \frac{+50}{+6} = \frac{25}{3}$

$-3(\frac{25}{3}\cdot\frac{25}{3}) + 50\cdot\frac{25}{3}$

$-\frac{625}{3} + \frac{1250}{3}$

$\frac{625}{3}$