Standard Form of Quadratic Functions

$$y = ax^2 + bx + c$$
$$a \neq 0$$

$a = 1 \quad b = 2 \quad c = -3$

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

Solution set
$\{-3, 1\}$

X-intercept
$(-3, 0)$
Root
zero $x = -3$
Solution

X-intercept
$(+1, 0)$
Root
zero $x = 1$
Solution

Axis of Symmetry (AOS)

Vertical line through the vertex, divides graph into symmetrical halves
$x = \dfrac{-b}{2a}$
$x = $ same x-value of the vertex x

Vertex
min/max point on a parabola

$\left(\dfrac{-b}{2a}, y\right)$
↓ solve for
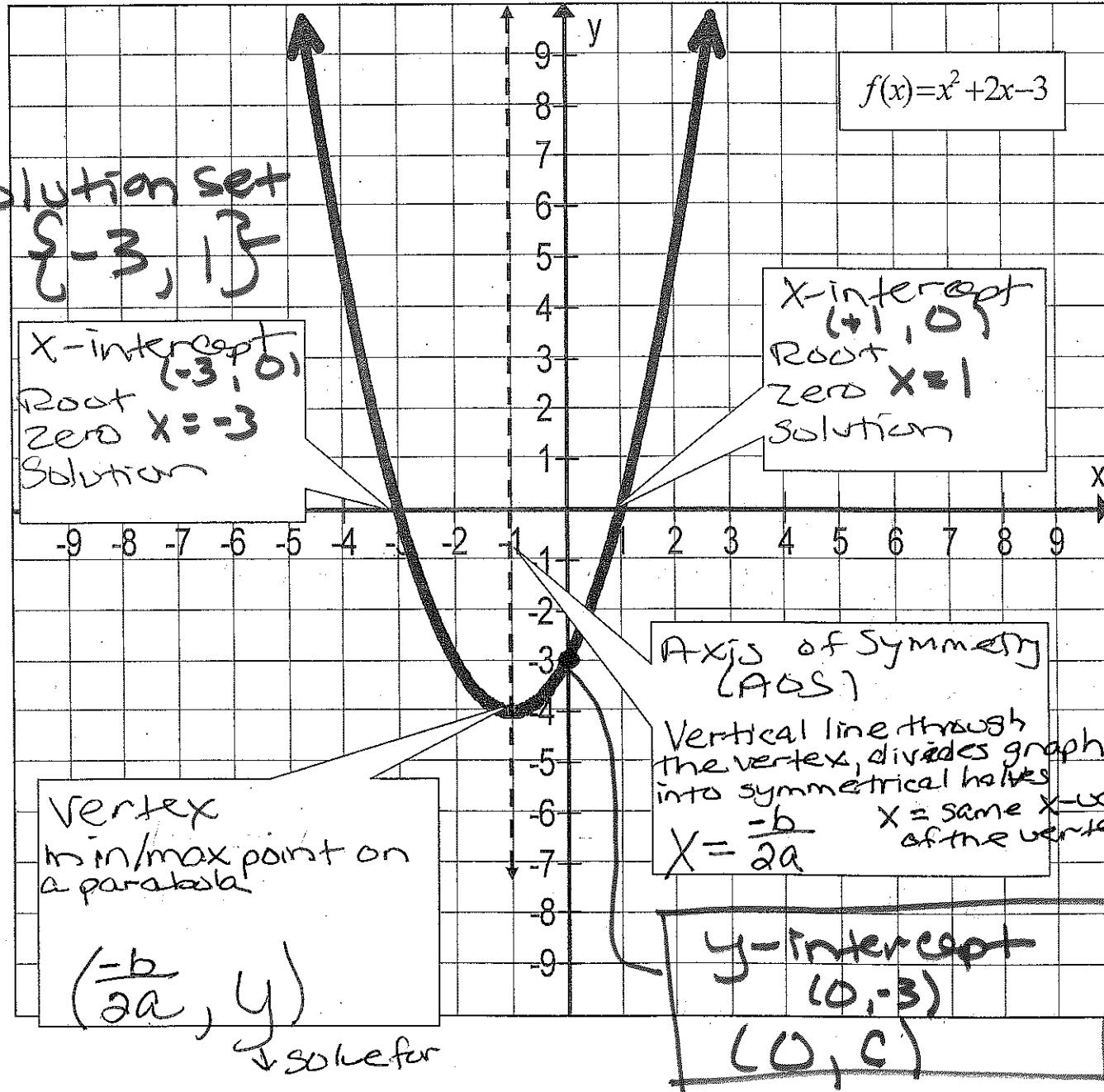
y-intercept
$(0, -3)$
$(0, c)$

same

Find the solutions, roots, x-intercepts, or zeros. Also find the vertex, y-intercept, and the equation for the axis of symmetry.

solve for y

$y = (-3)^2 + 6(-3) + 1$
$y = -12$

1. $y = x^2 + 6x - 7$

$a = 1 \quad b = 6 \quad c = -7$

roots: $(1,0) \ (-7,0) \qquad X = 1 \quad X = -7$

vertex: $(-3, -16)$

y-int: $(0, -7)$

axis of symmetry:
$X = \frac{-6}{2(1)} \qquad \boxed{X = -3}$

now find y

2. $y = x^2 - 25$

$a = 1 \quad b = 0 \quad c = -25$

x-int: $(5,0) \ (-5,0)$

vertex: $(0, -25)$

y-intercept: $(0, -25)$

axis of symmetry: $X = 0$

3. $y = x^2 - 6x + 9$

$a = 1 \quad b = -6 \quad c = 9$

solutions: $(3,0)$ or $X = 3$

vertex: $(3, 0)$ Look up in table or FSS y int in calc

y-intercept: $(0, 9)$

axis of symmetry:
$X = \frac{-b}{2a} \quad X = \frac{6}{2} \quad \boxed{X = 3}$

4. $y = x^2 + 2x - 3$

$a = 1 \quad b = 2 \quad c = -3$

zeros: $(1,0) \ (-3,0)$ or $\{-3, 1\}$

vertex: $(-1, -4)$

$(0,c) \leftarrow$ y-intercept: $(0, -3)$

axis of symmetry:
$X = \frac{-b}{2a} \quad X = \frac{-(2)}{2(1)} \quad \boxed{X = -1}$

5. $y = x^2 - 2x - 15$

$a = 1 \quad b = -2 \quad c = -15$

roots: $(-3, 0), (5, 0)$

vertex: $(1, -16)$

y-int: $(0, -15)$

axis of symmetry:
$X = \frac{-(-2)}{2(1)} \quad \boxed{X = 1}$

6. $y = x^2 - 4x - 21$

$a = 1 \quad b = -4 \quad c = -21$

solutions: $\{-3, 7\}$

vertex: $(2, -25)$

y-intercept: $(0, -21)$

axis of symmetry:
$X = \frac{4}{2} \quad \boxed{X = 2}$

7. $y = -x^2 - 2x - 5$

$a = -1 \quad b = -2 \quad c = -5$

x-int: none

max
vertex: $(-1, -4)$

y-intercept: $(0, -5)$

axis of symmetry:
$X = \frac{-(-2)}{2(-1)} = -1 \quad \boxed{X = -1}$

8. $y = 2x^2 - 9x - 5$

$a = 2 \quad b = -9 \quad c = -5$

use calc to find zero

x-int: $(5, 0) \ (-.5, 0)$

vertex: $(2.25, -15.125)$

y-intercept: $(0, -5)$

axis of symmetry:
$X = \frac{-(-9)}{2(2)} \quad X = \frac{9}{4}$ or 2.25

on calc
2nd trace
minimum
Left Bound → blinking dot ω?
Right Bound → must match ω
arrow dot L & R
Enter