Intercepts of the Quadratic

Given a quadratic $x(h) = a\,h^2 + b\,h + c$ compute its discriminant $\triangle$:

$\triangle = \sqrt{b^2 - 4\,ac}$

Case1: $\triangle > 0$

$h_{1,2} = \frac{-b \pm \sqrt{b^2 - 4\,ac}}{2a}$ computes the h-intercepts of multiplicity 1.

$x(0) = c$ computes the single x-intercept.

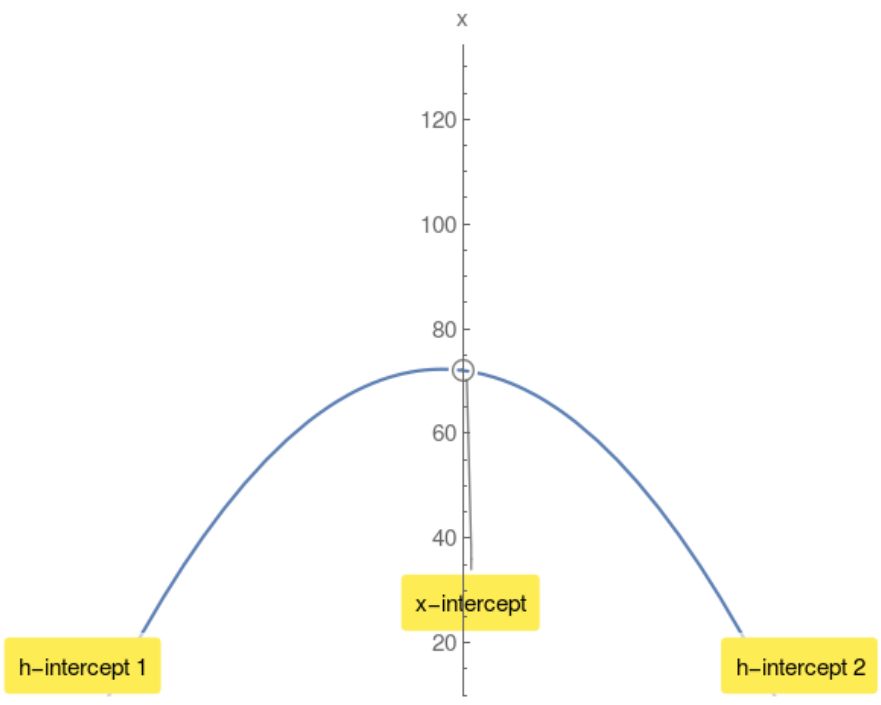
Example 1.

$x(h) = -h^2 - h + 72$ compute its discriminant $\triangle$:

$\triangle = 289 > 0$

$h_{1,2} = -9, 8$

$x(0) = 72$ x-intercept.



Case2: $\triangle = 0$

$h_{1,2} = \frac{-b \pm \sqrt{b^2 - 4\,ac}}{2a} = \frac{-b \pm 0}{2a} = \frac{-b}{2a}$ single h-intercept of multiplicity 2.

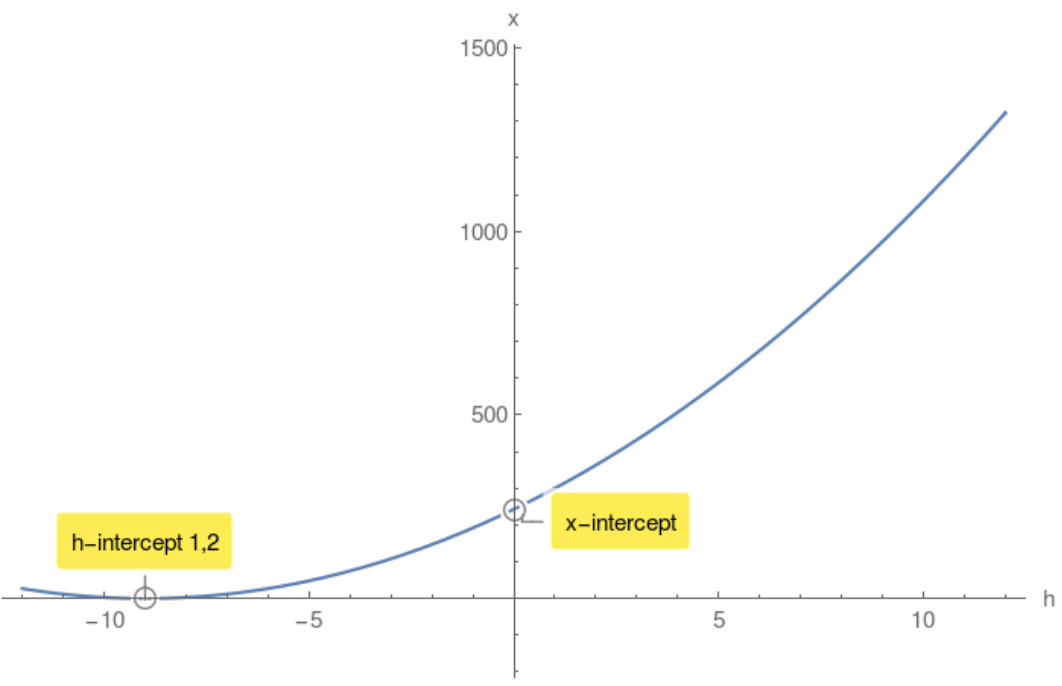
Example 2.

$x(h) = 3\,h^2 + 54\,h + 243$ compute its discriminant $\triangle$:

$\triangle = 0$

$h_{1,2} = -9, -9$

$x(0) = 243$ x-intercept.



Case3: $\triangle < 0$

$\sqrt{b^2 - 4\,ac}$ has no value in Real Numbers. Therefore there are no h-intercepts.

However there is a x-intercept.

Example 3.

$x(h) = 9\,h^2 - 162\,h + 810$ compute its discriminant $\triangle$:

$\triangle = -2916 < 0$

$x(0) = 810$ x-intercept.