Intercepts of the Quadratic

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

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

Case1: $\triangle > 0$

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

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

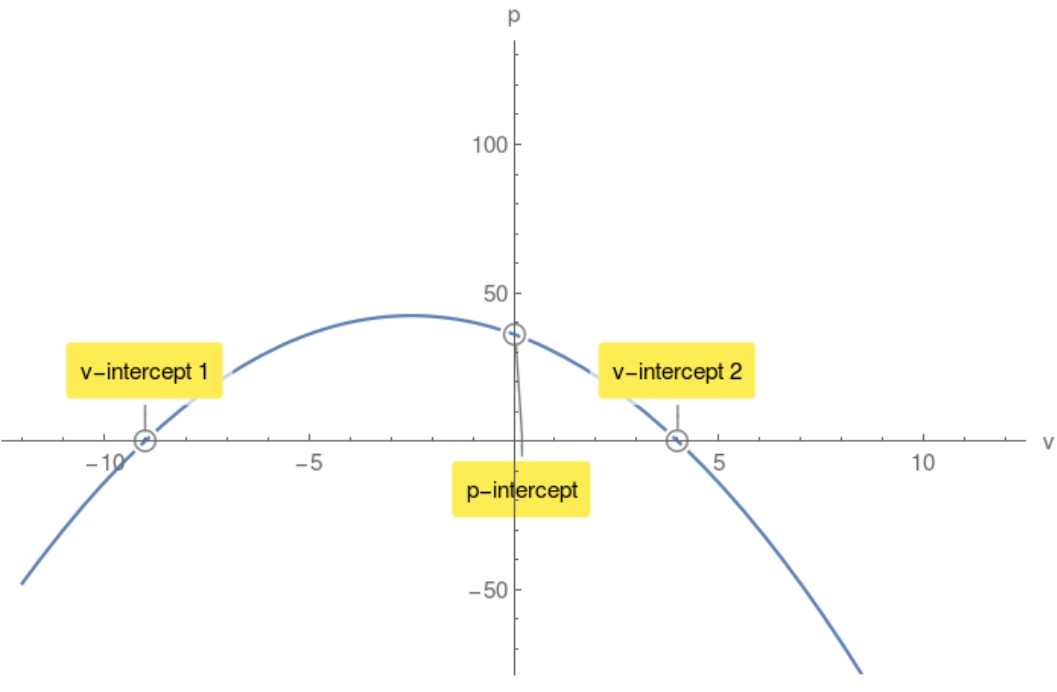
Example 1.

$p(v) = -v^2 - 5\,v + 36$ compute its discriminant $\triangle$:

$\triangle = 169 > 0$

$v_{1,2} = -9, 4$

$p(0) = 36$ p-intercept.



Case2: $\triangle = 0$

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

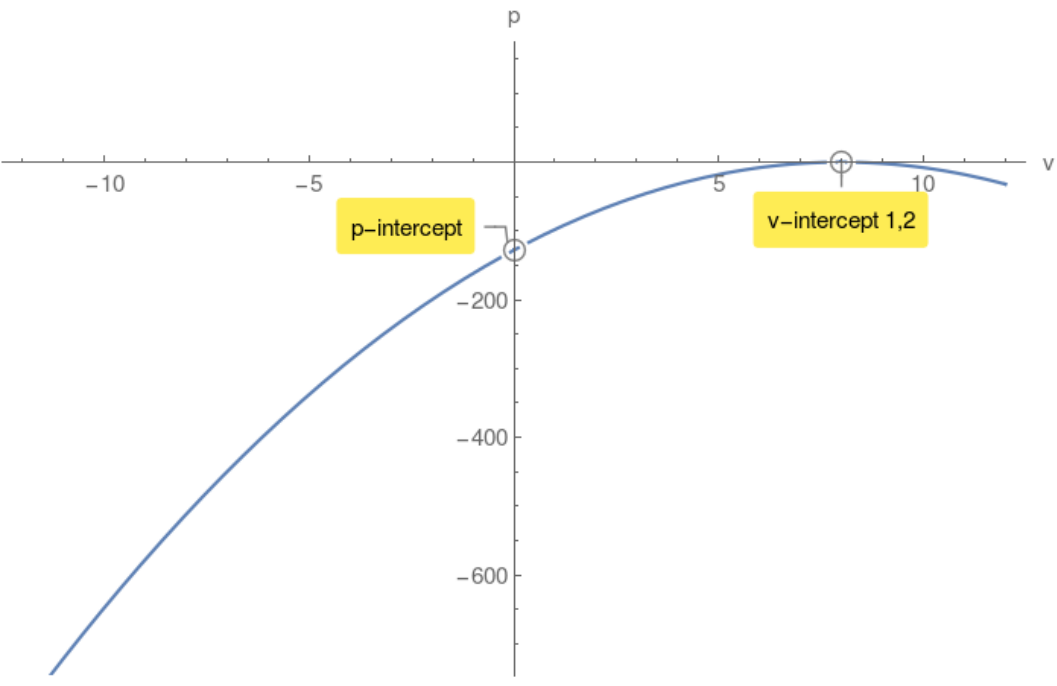
Example 2.

$p(v) = -2\,v^2 + 32\,v - 128$ compute its discriminant $\triangle$:

$\triangle = 0$

$v_{1,2} = 8, 8$

$p(0) = -128$ p-intercept.



Case3: $\triangle < 0$

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

However there is a p-intercept.

Example 3.

$p(v) = 9\,v^2 + 144\,v + 640$ compute its discriminant $\triangle$:

$\triangle = -2304 < 0$

$p(0) = 640$ p-intercept.