Intercepts of the Quadratic

Given a quadratic $f(v) = a\,v^2 + b\,v + c$ 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.

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

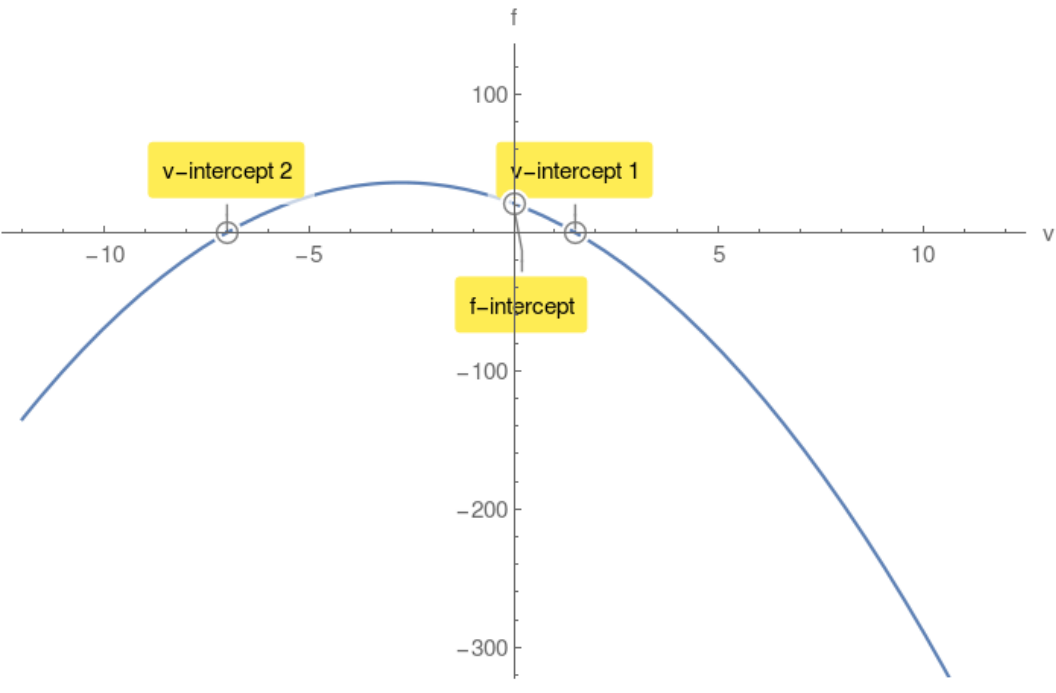
Example 1.

$f(v) = -2\,v^2 - 11\,v + 21$ compute its discriminant $\triangle$:

$\triangle = 289 > 0$

$v_{1,2} = \frac{3}{2}, -7$

$f(0) = 21$ f-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.

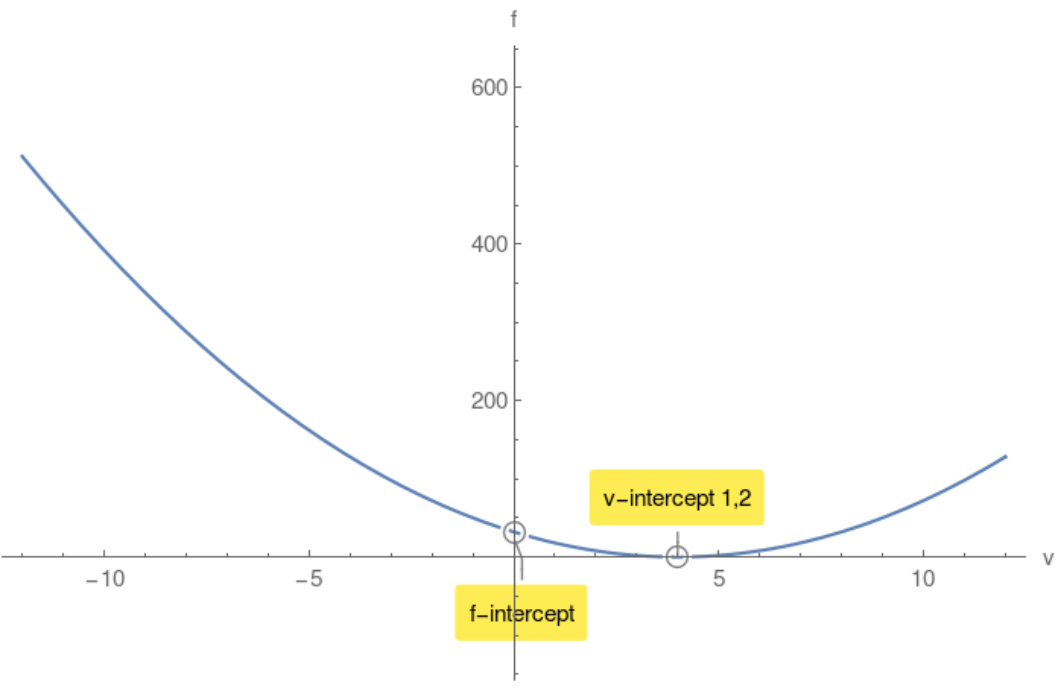
Example 2.

$f(v) = 2\,v^2 - 16\,v + 32$ compute its discriminant $\triangle$:

$\triangle = 0$

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

$f(0) = 32$ f-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 f-intercept.

Example 3.

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

$\triangle = -2916 < 0$

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