Intercepts of the Quadratic

Given a quadratic $u(v) = a\,v^2 + b\,v + c$ 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.
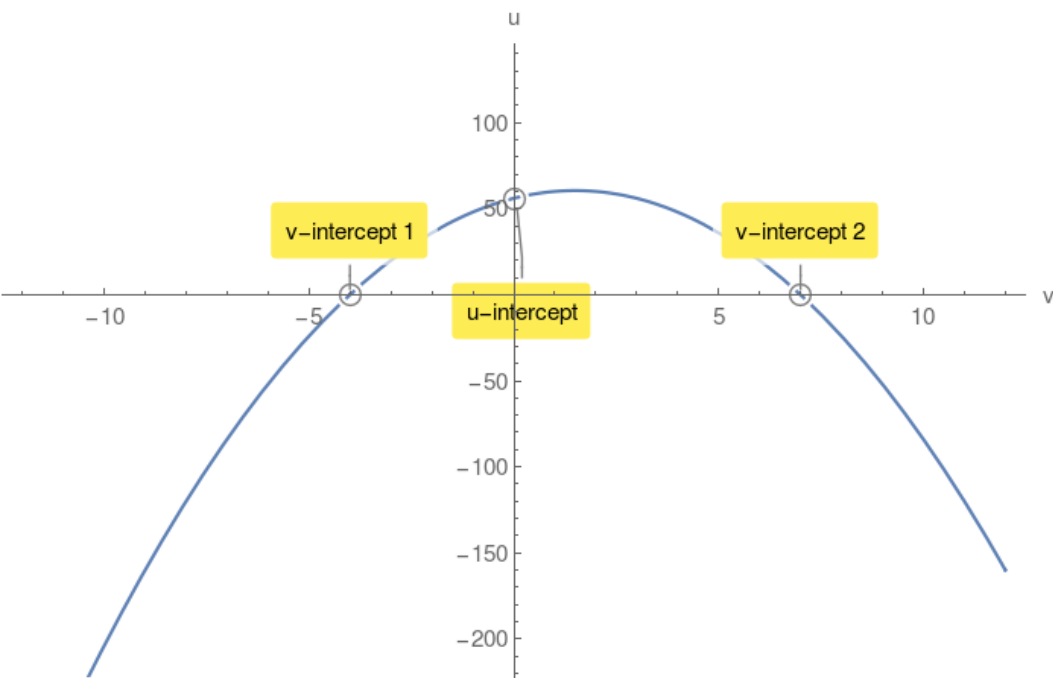
$u(0) = c$ computes the single u–intercept.

Example 1.

$u(v) = -2\,v^2 + 6\,v + 56$ compute its discriminant $\triangle$:
$\triangle = 484 > 0$
$v_{1,2} = -4, 7$
$u(0) = 56$ u–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.
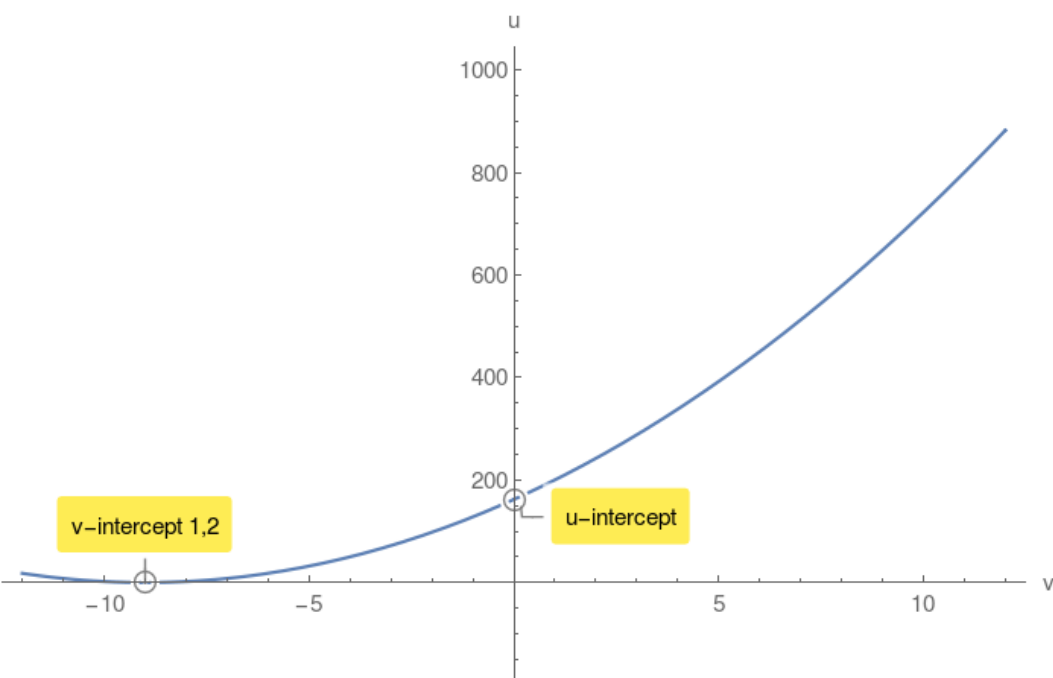
Example 2.

$u(v) = 2\,v^2 + 36\,v + 162$ compute its discriminant $\triangle$:
$\triangle = 0$
$v_{1,2} = -9, -9$
$u(0) = 162$ u–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 u–intercept.

Example 3.

$u(v) = 9\,v^2 + 180\,v + 1000$ compute its discriminant $\triangle$:
$\triangle = -3600 < 0$
$u(0) = 1000$ u–intercept.