Intercepts of the Quadratic

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

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

Case1: $\triangle > 0$

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

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

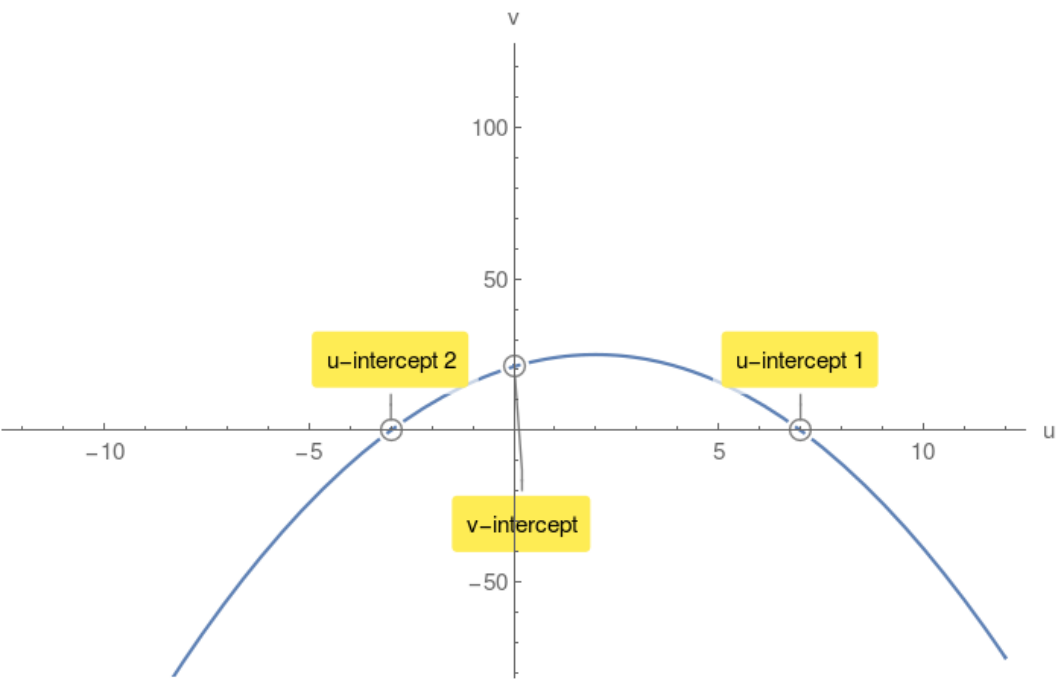
Example 1.

$v(u) = -u^2 + 4\,u + 21$ compute its discriminant $\triangle$:

$\triangle = 100 > 0$

$u_{1,2} = 7, -3$

$v(0) = 21$ v-intercept.



Case2: $\triangle = 0$

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

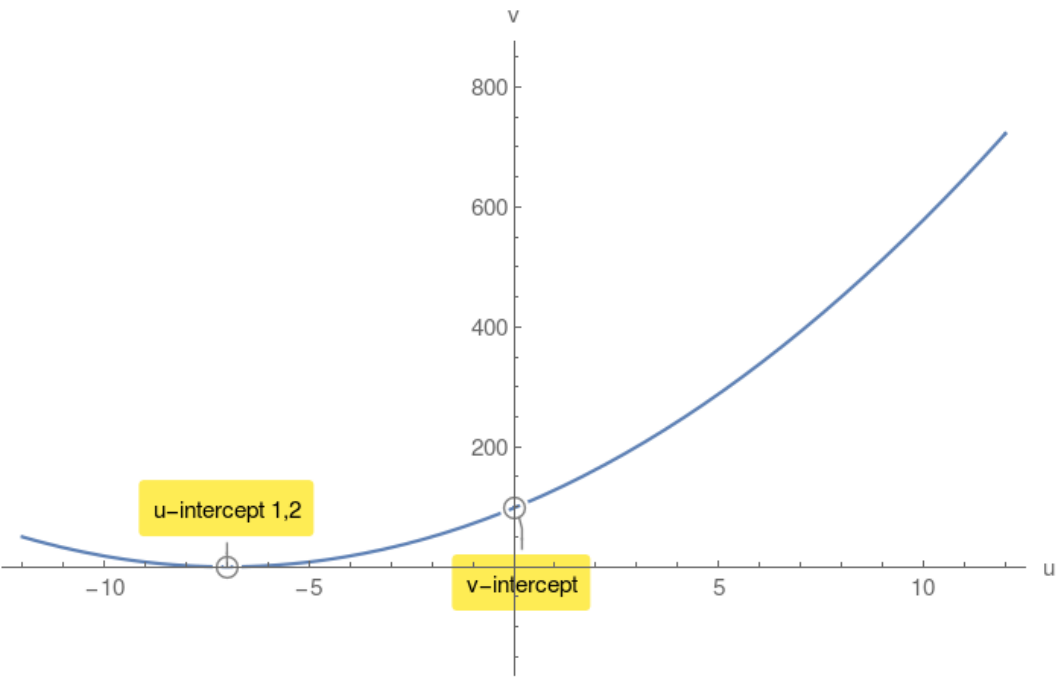
Example 2.

$v(u) = 2\,u^2 + 28\,u + 98$ compute its discriminant $\triangle$:

$\triangle = 0$

$u_{1,2} = -7, -7$

$v(0) = 98$ v-intercept.



Case3: $\triangle < 0$

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

However there is a v-intercept.

Example 3.

$v(u) = -4\,u^2 - 80\,u - 500$ compute its discriminant $\triangle$:

$\triangle = -1600 < 0$

$v(0) = -500$ v-intercept.