

Intercepts of the Quadratic

Given a quadratic $u(k) = a k^2 + b k + c$ compute its discriminant Δ :

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

Case1: $\Delta > 0$

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

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

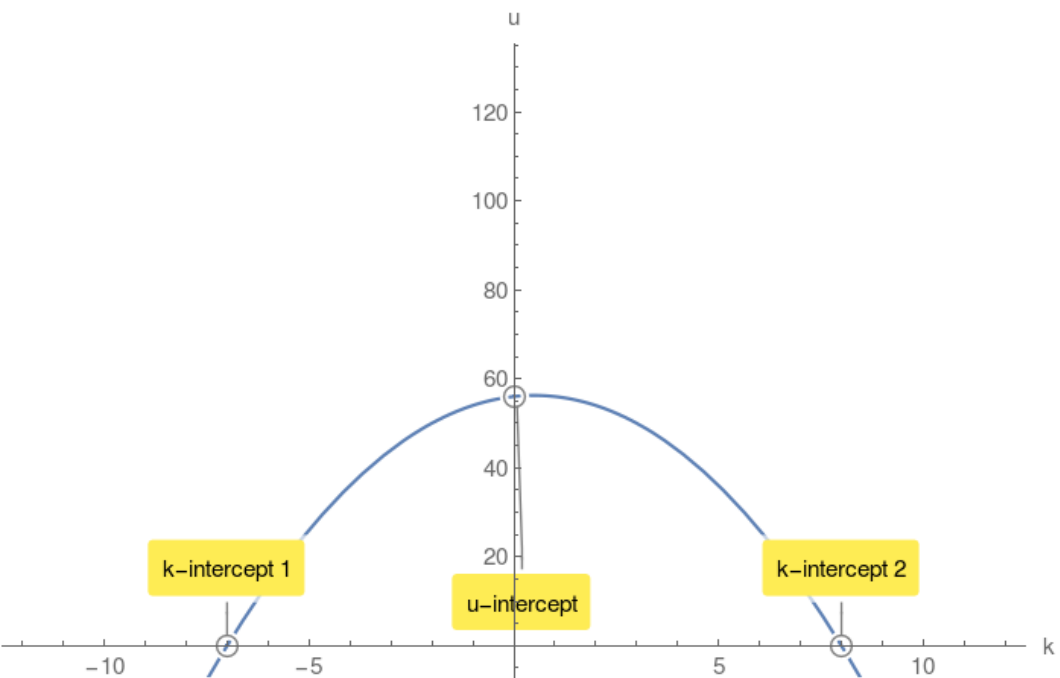
Example 1.

$u(k) = -k^2 + k + 56$ compute its discriminant Δ :

$$\Delta = 225 > 0$$

$$k_{1,2} = -7, 8$$

$u(0) = 56$ u-intercept.



Case2: $\Delta = 0$

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

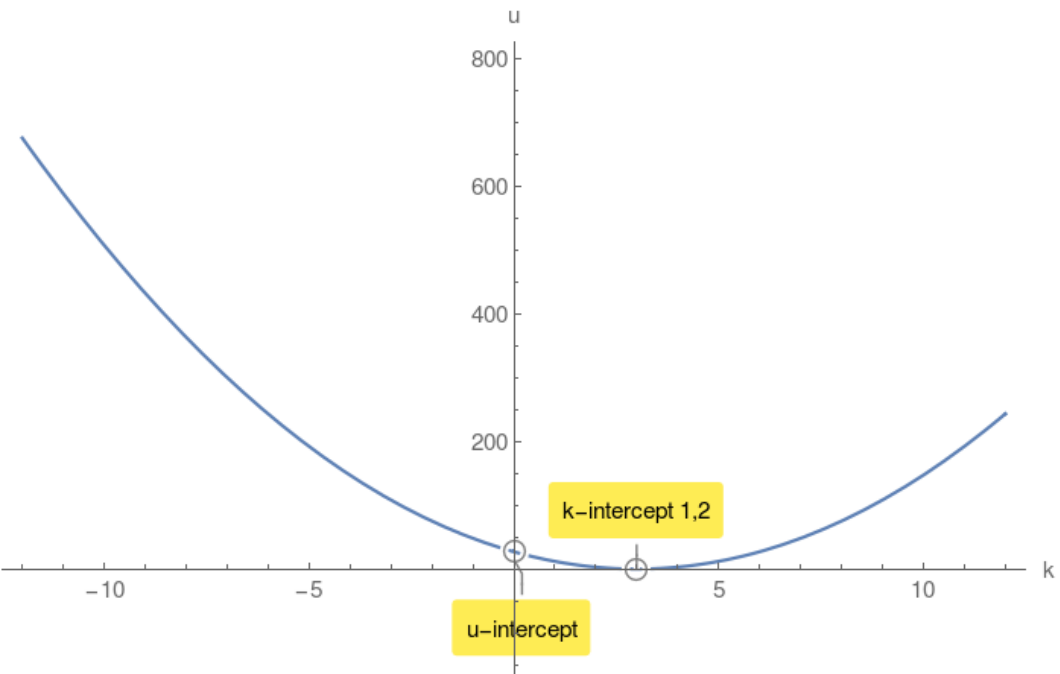
Example 2.

$u(k) = 3k^2 - 18k + 27$ compute its discriminant Δ :

$$\Delta = 0$$

$$k_{1,2} = 3, 3$$

$u(0) = 27$ u-intercept.



Case3: $\Delta < 0$

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

However there is a u-intercept.

Example 3.

$u(k) = -9k^2 + 144k - 640$ compute its discriminant Δ :

$$\Delta = -2304 < 0$$

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

