Intercepts of the Quadratic

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

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

Case1: $\triangle>0$

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

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

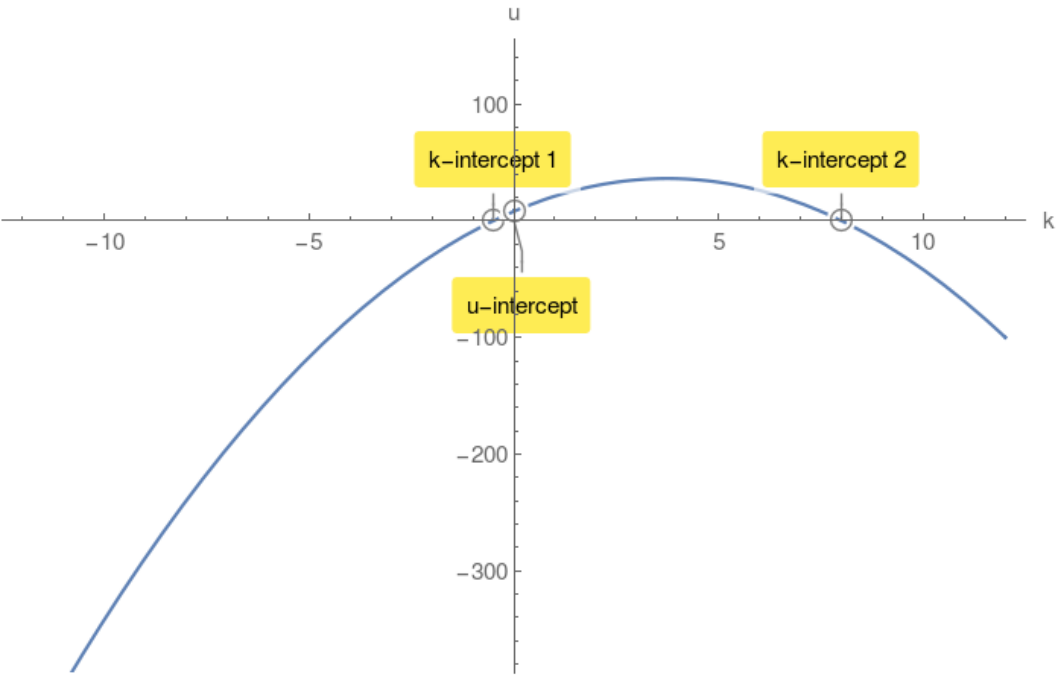
Example 1.

$u(k)=-2\,k^2+15\,k+8$ compute its discriminant $\triangle$:

$\triangle=289>0$

$k_{1,2}=-\frac{1}{2},8$

$u(0)=8$ u-intercept.



Case2: $\triangle=0$

$k_{1,2}=\frac{-b\pm\sqrt{b^2-4\,ac}}{2a}=\frac{-b\pm0}{2a}=\frac{-b}{2a}$ single k-intercept of multiplicity 2.

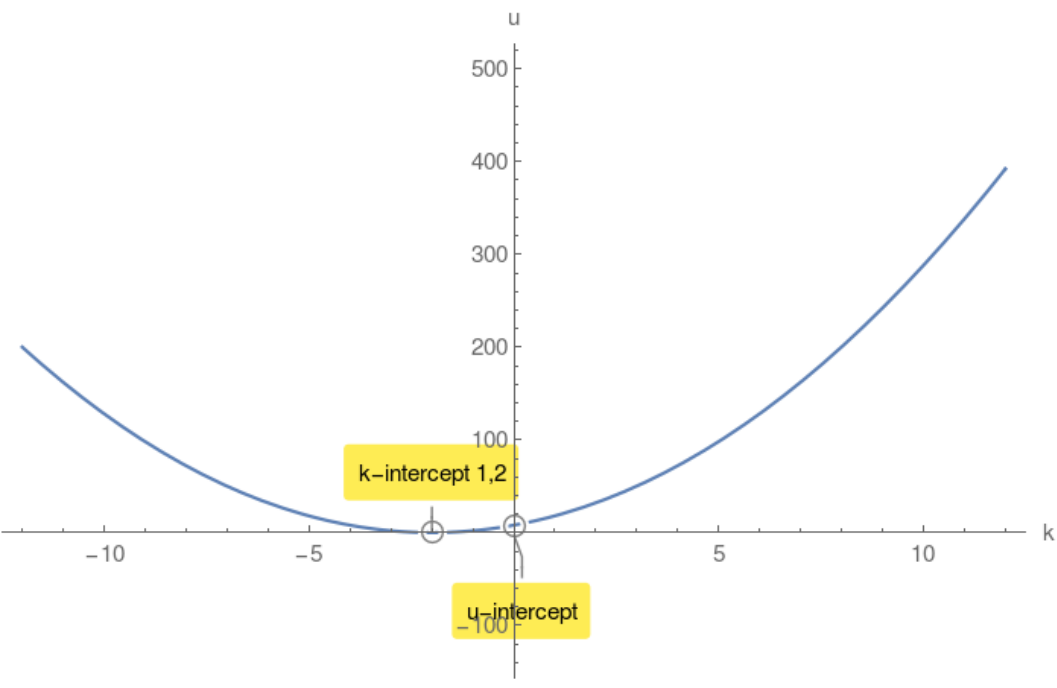
Example 2.

$u(k)=2\,k^2+8\,k+8$ compute its discriminant $\triangle$:

$\triangle=0$

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

$u(0)=8$ u-intercept.



Case3: $\triangle<0$

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

However there is a u-intercept.

Example 3.

$u(k)=-9\,k^2-180\,k-1000$ compute its discriminant $\triangle$:

$\triangle=-3600<0$

$u(0)=-1000$ u-intercept.