Intercepts of the Quadratic

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

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

Case1: $\triangle>0$

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

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

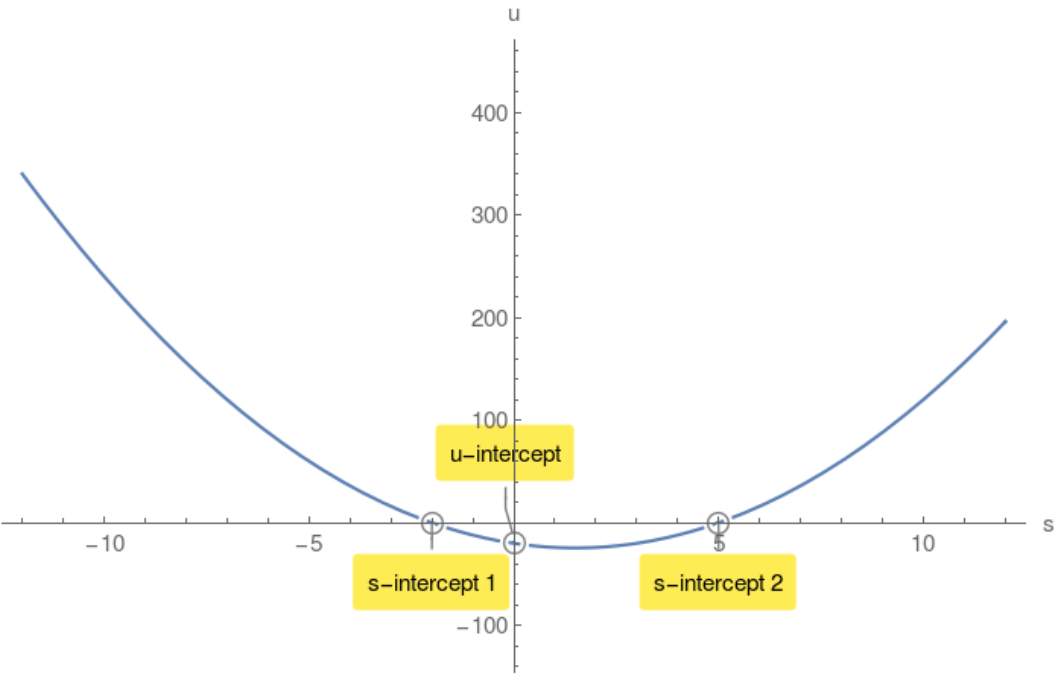
Example 1.

$u(s)=2\,s^2-6\,s-20$ compute its discriminant $\triangle$:

$\triangle=196>0$

$s_{1,2}=-2,5$

$u(0)=-20$ u-intercept.



Case2: $\triangle=0$

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

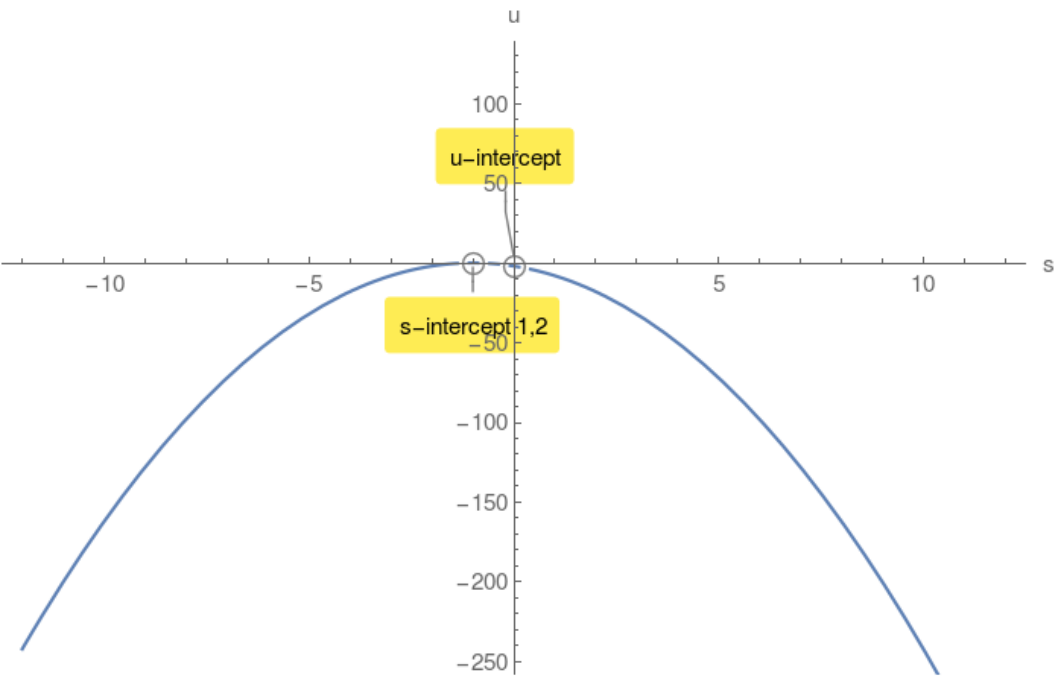
Example 2.

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

$\triangle=0$

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

$u(0)=-2$ u-intercept.



Case3: $\triangle<0$

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

However there is a u-intercept.

Example 3.

$u(s)=-4\,s^2+64\,s-320$ compute its discriminant $\triangle$:

$\triangle=-1024<0$

$u(0)=-320$ u-intercept.