Intercepts of the Quadratic

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

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

Case1: $\triangle>0$

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

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

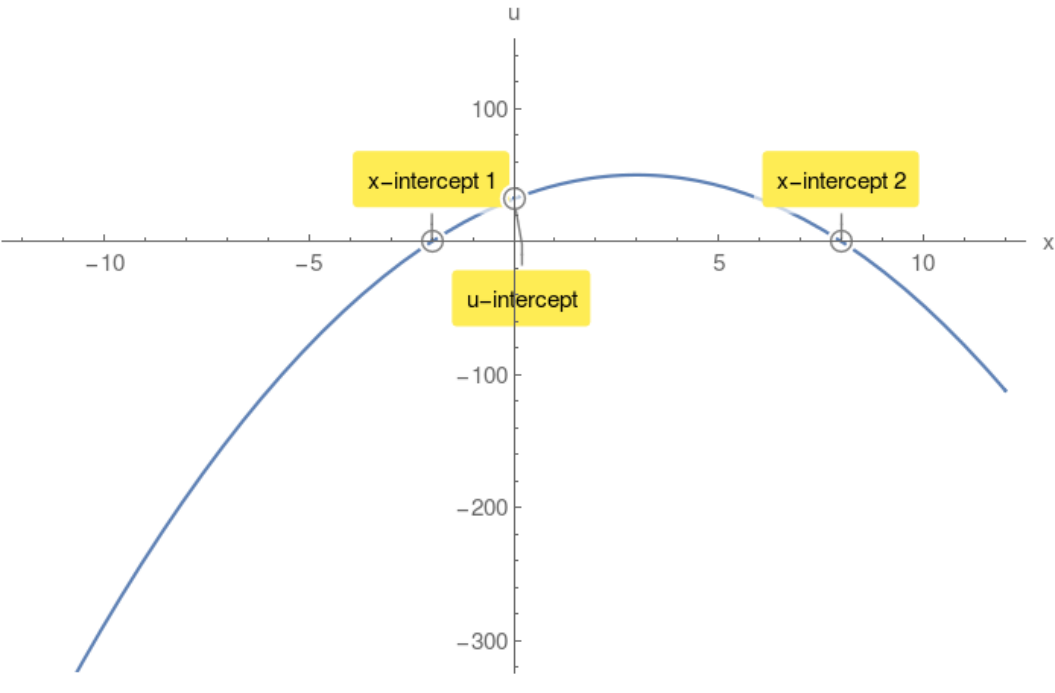
Example 1.

$u(x)=-2\,x^2+12\,x+32$ compute its discriminant $\triangle$:

$\triangle=400>0$

$x_{1,2}=-2,8$

$u(0)=32$ u-intercept.



Case2: $\triangle=0$

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

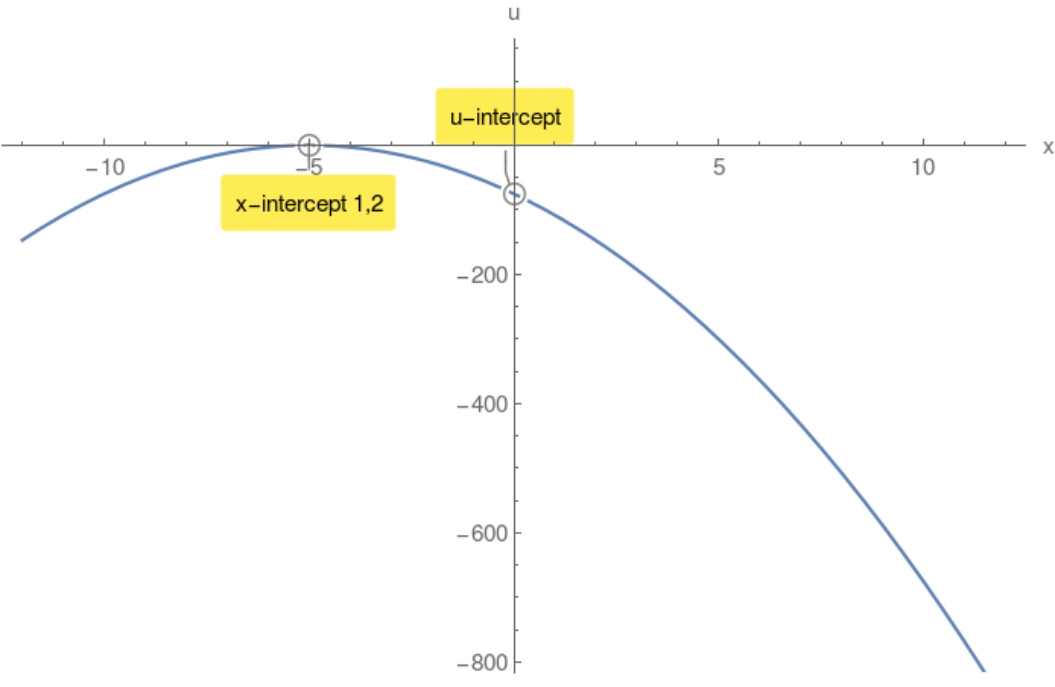
Example 2.

$u(x)=-3\,x^2-30\,x-75$ compute its discriminant $\triangle$:

$\triangle=0$

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

$u(0)=-75$ u-intercept.



Case3: $\triangle<0$

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

However there is a u-intercept.

Example 3.

$u(x)=9\,x^2+144\,x+640$ compute its discriminant $\triangle$:

$\triangle=-2304<0$

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