Intercepts of the Quadratic

Given a quadratic $r(u)=a\,u^2+b\,u+c$ 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.

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

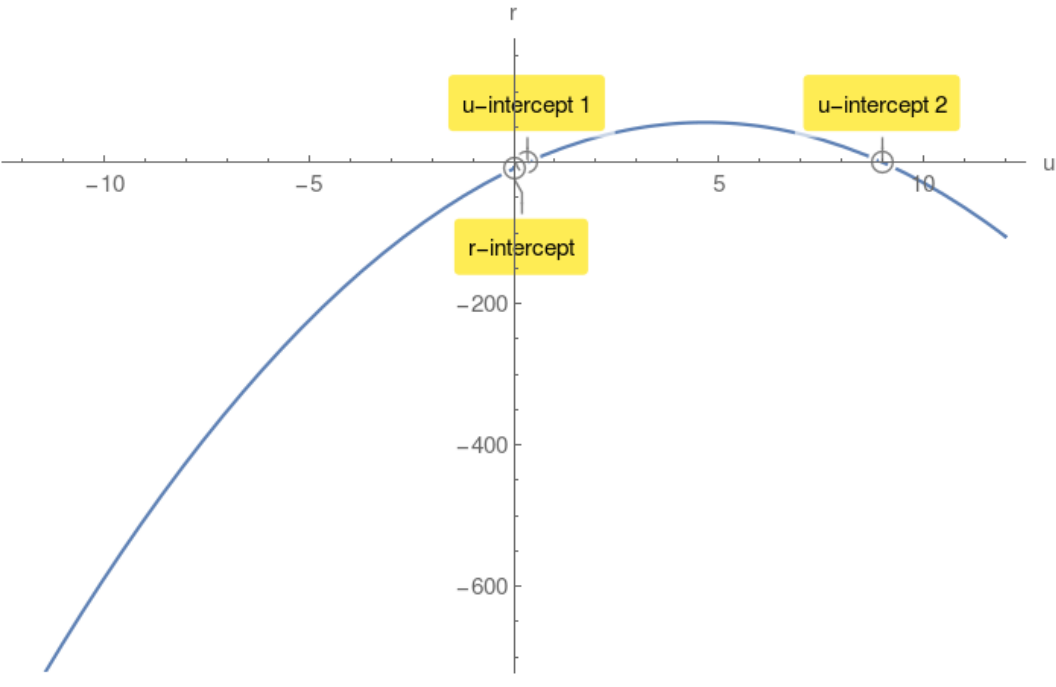
Example 1.

$r(u)=-3\,u^2+28\,u-9$ compute its discriminant $\triangle$:

$\triangle=676>0$

$u_{1,2}=\frac{1}{3},9$

$r(0)=-9$ r-intercept.



Case2: $\triangle=0$

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

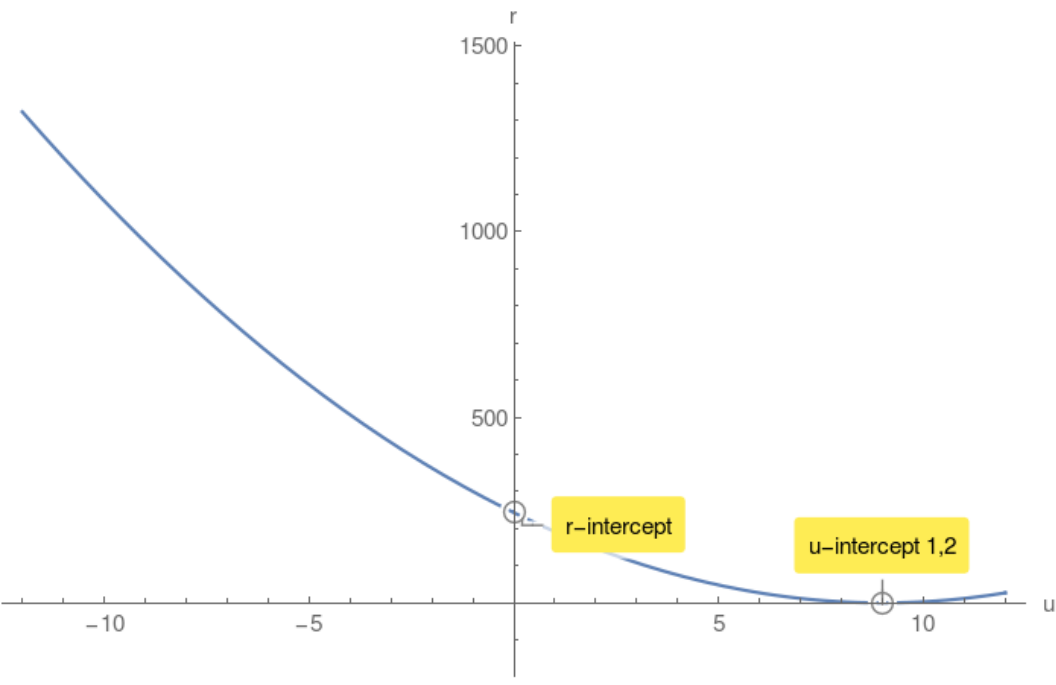
Example 2.

$r(u)=3\,u^2-54\,u+243$ compute its discriminant $\triangle$:

$\triangle=0$

$u_{1,2}=9,9$

$r(0)=243$ r-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 r-intercept.

Example 3.

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

$\triangle=-3600<0$

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