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.

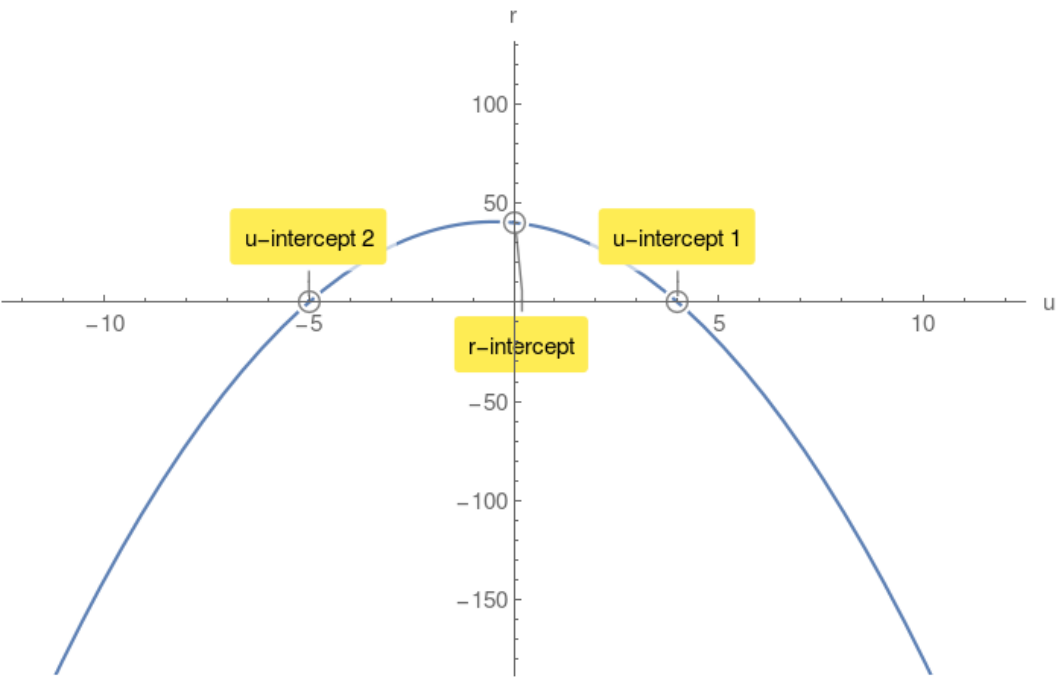
Example 1.

$r(u)=-2\,u^2-2\,u+40$ compute its discriminant $\triangle$:

$\triangle=324>0$

$u_{1,2}=4,-5$

$r(0)=40$ 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.

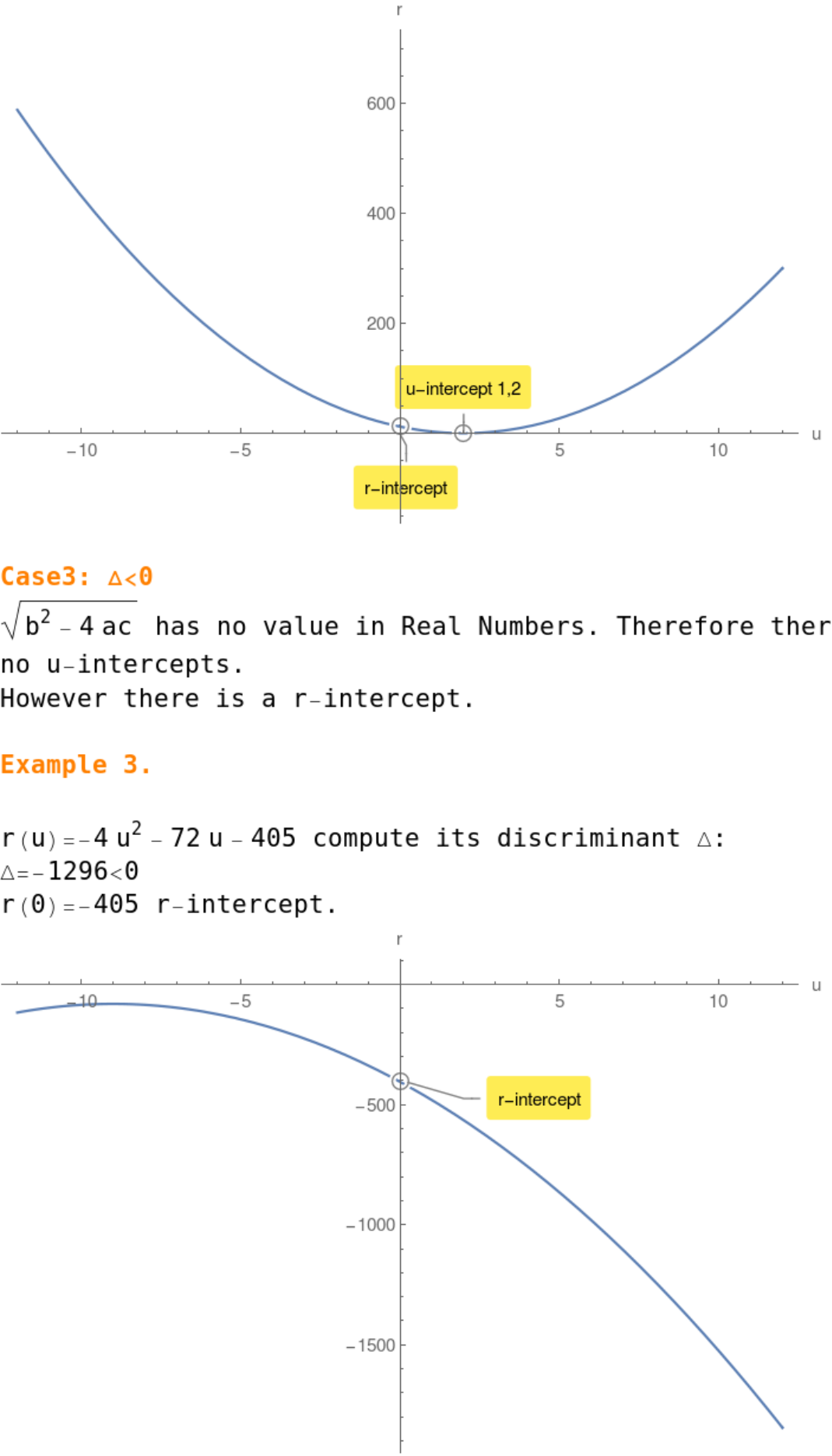
Example 2.

$r(u)=3\,u^2-12\,u+12$ compute its discriminant $\triangle$:

$\triangle=0$

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

$r(0)=12$ 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.

$r(u)=-4\,u^2-72\,u-405$ compute its discriminant $\triangle$:

$\triangle=-1296<0$

$r(0)=-405$ r-intercept.