Intercepts of the Quadratic

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

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

Case1: $\triangle>0$

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

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

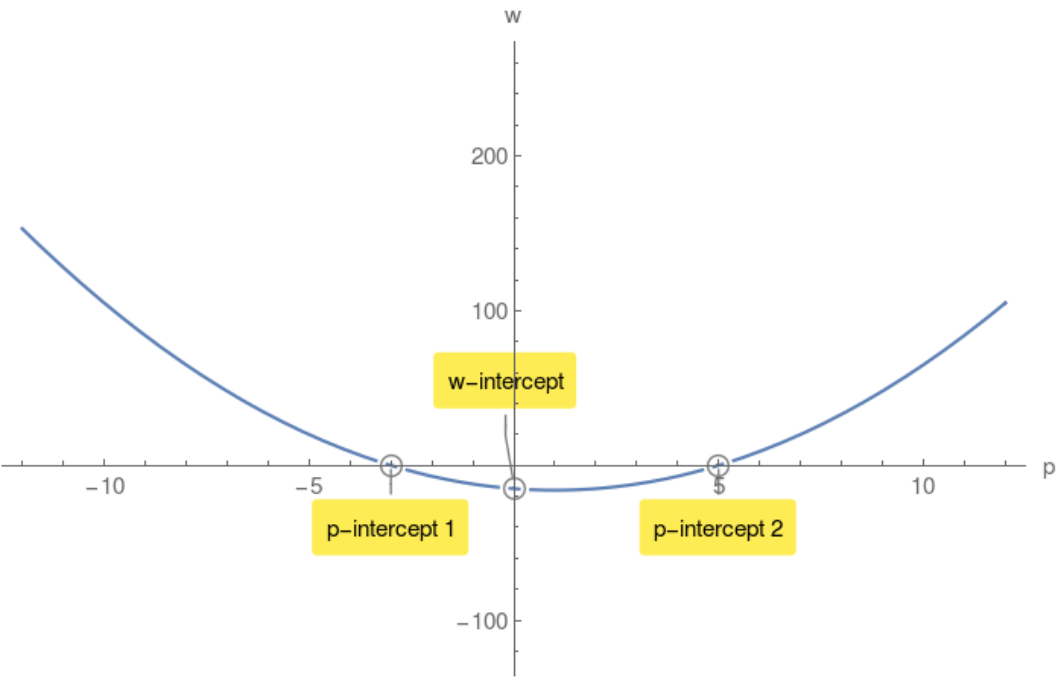
Example 1.

$w(p)=p^2-2\,p-15$ compute its discriminant $\triangle$:

$\triangle=64>0$

$p_{1,2}=-3,5$

$w(0)=-15$ w-intercept.



Case2: $\triangle=0$

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

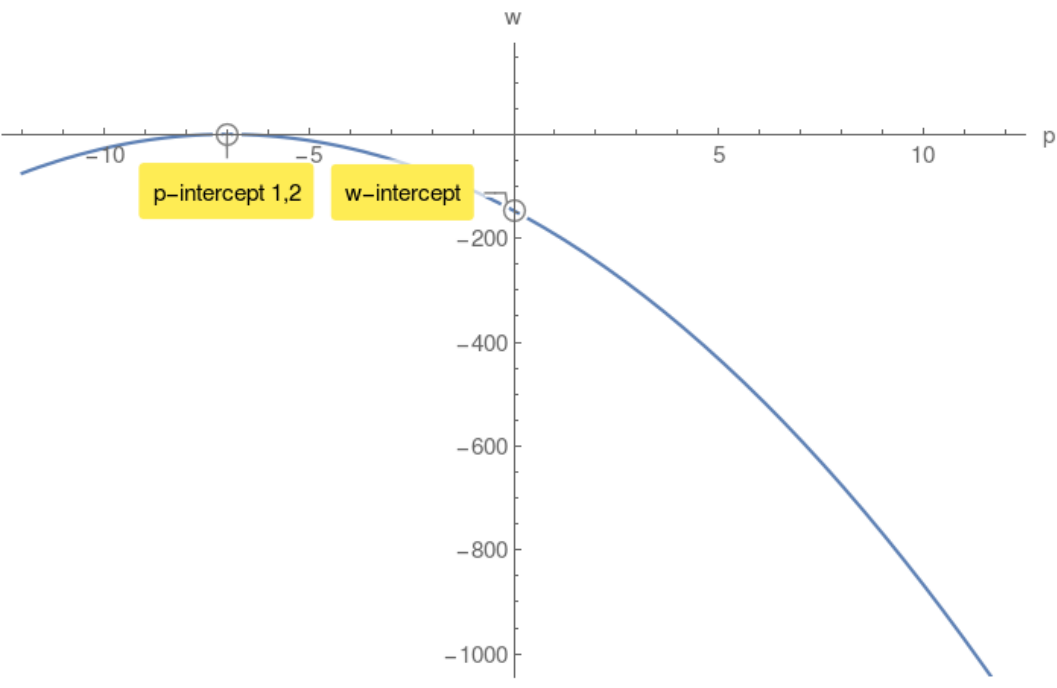
Example 2.

$w(p)=-3\,p^2-42\,p-147$ compute its discriminant $\triangle$:

$\triangle=0$

$p_{1,2}=-7,-7$

$w(0)=-147$ w-intercept.



Case3: $\triangle<0$

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

However there is a w-intercept.

Example 3.

$w(p)=-4\,p^2+56\,p-245$ compute its discriminant $\triangle$:

$\triangle=-784<0$

$w(0)=-245$ w-intercept.