Intercepts of the Quadratic

Given a quadratic $w(x)=a\,x^2+b\,x+c$ 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.

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

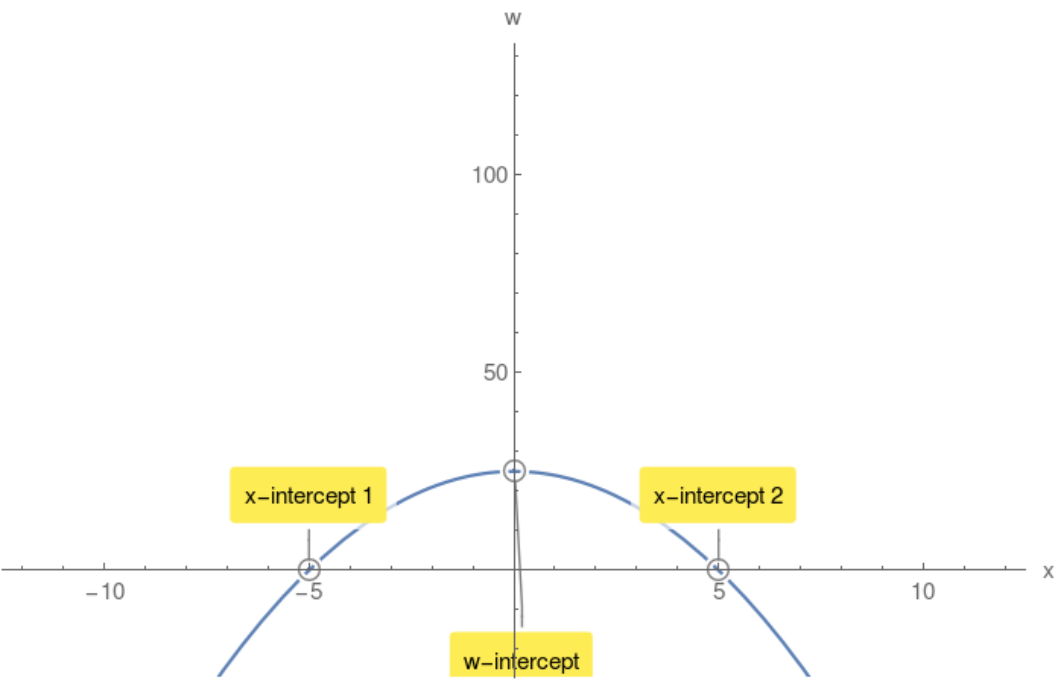
Example 1.

$w(x)=25-x^2$ compute its discriminant $\triangle$:

$\triangle=100>0$

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

$w(0)=25$ w-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.

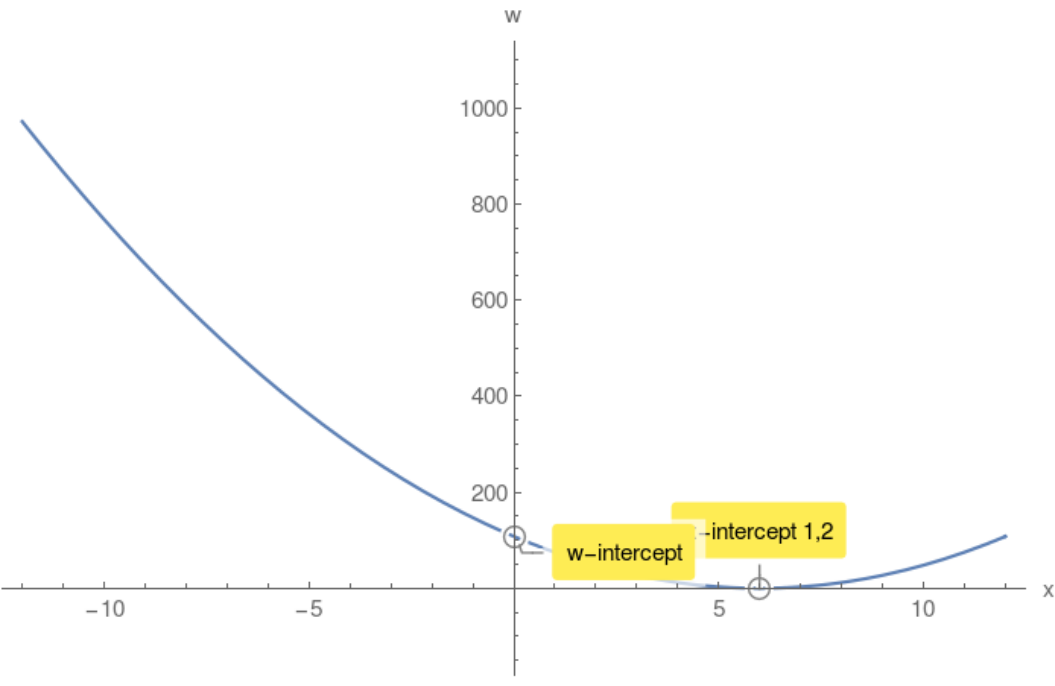
Example 2.

$w(x)=3\,x^2-36\,x+108$ compute its discriminant $\triangle$:

$\triangle=0$

$x_{1,2}=6,6$

$w(0)=108$ w-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 w-intercept.

Example 3.

$w(x)=-4\,x^2+72\,x-405$ compute its discriminant $\triangle$:

$\triangle=-1296<0$

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