Intercepts of the Quadratic

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

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

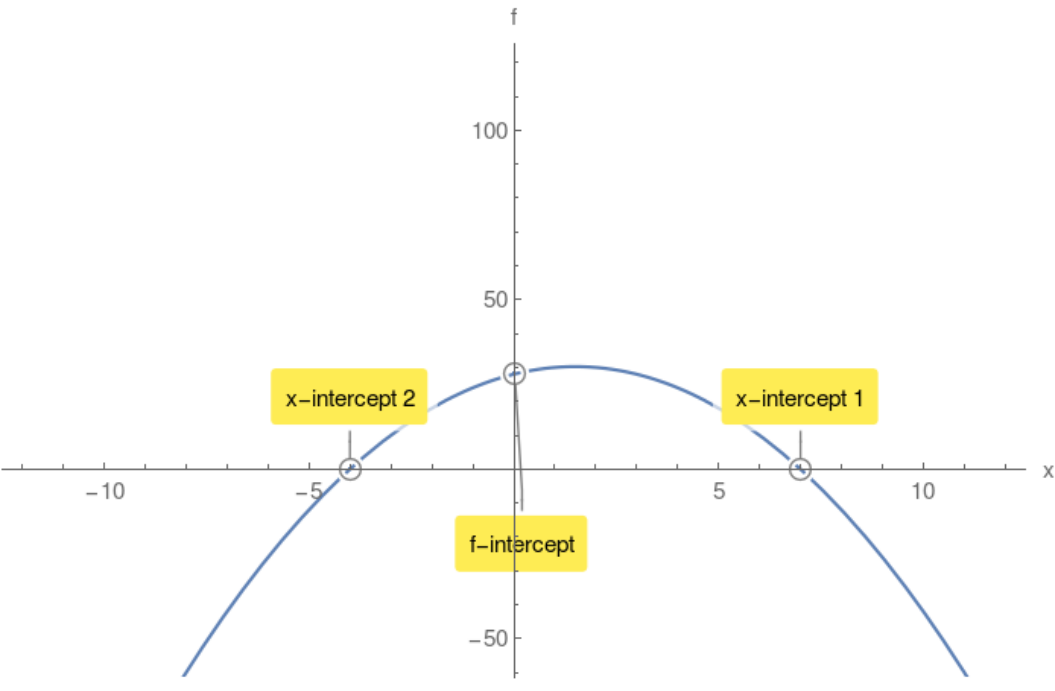
Example 1.

$f(x)=-x^2+3\,x+28$ compute its discriminant $\triangle$:

$\triangle=121>0$

$x_{1,2}=7,-4$

$f(0)=28$ f-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.

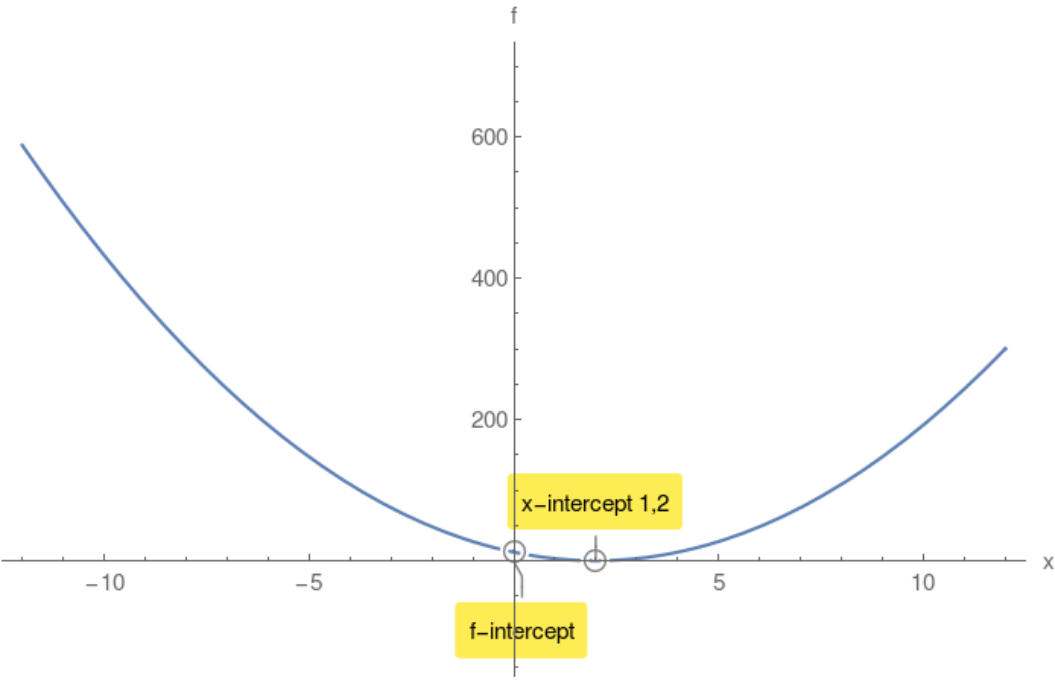
Example 2.

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

$\triangle=0$

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

$f(0)=12$ f-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 f-intercept.

Example 3.

$f(x)=-9\,x^2+126\,x-490$ compute its discriminant $\triangle$:

$\triangle=-1764<0$

$f(0)=-490$ f-intercept.