Intercepts of the Quadratic

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

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

Case1: $\triangle>0$

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

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

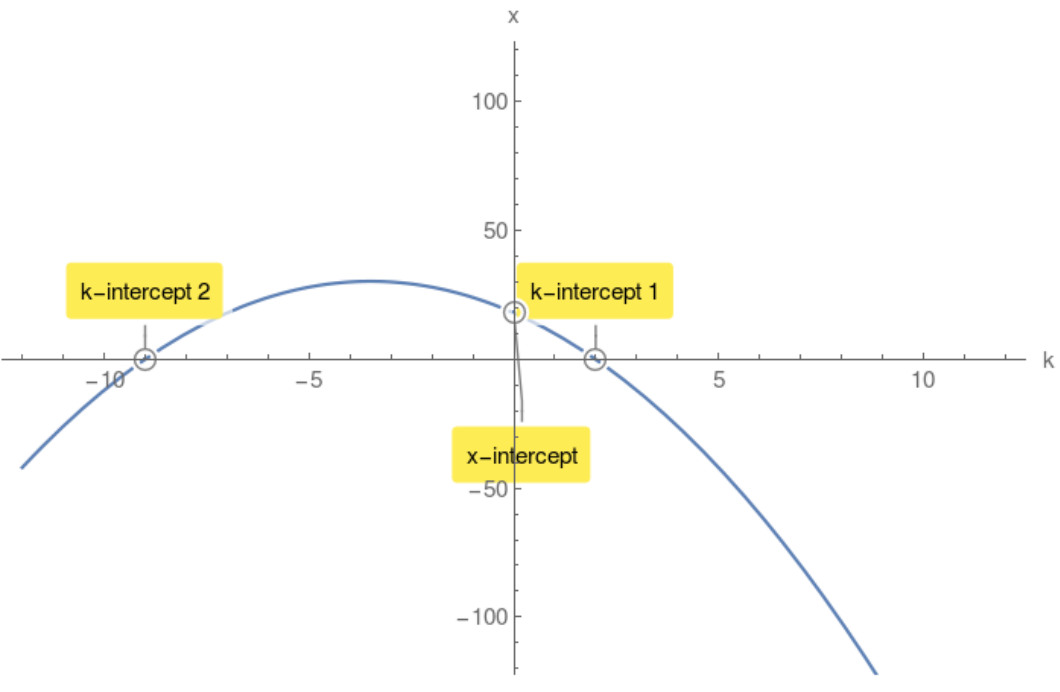
Example 1.

$x(k)=-k^2-7\,k+18$ compute its discriminant $\triangle$:

$\triangle=121>0$

$k_{1,2}=2,-9$

$x(0)=18$ x-intercept.



Case2: $\triangle=0$

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

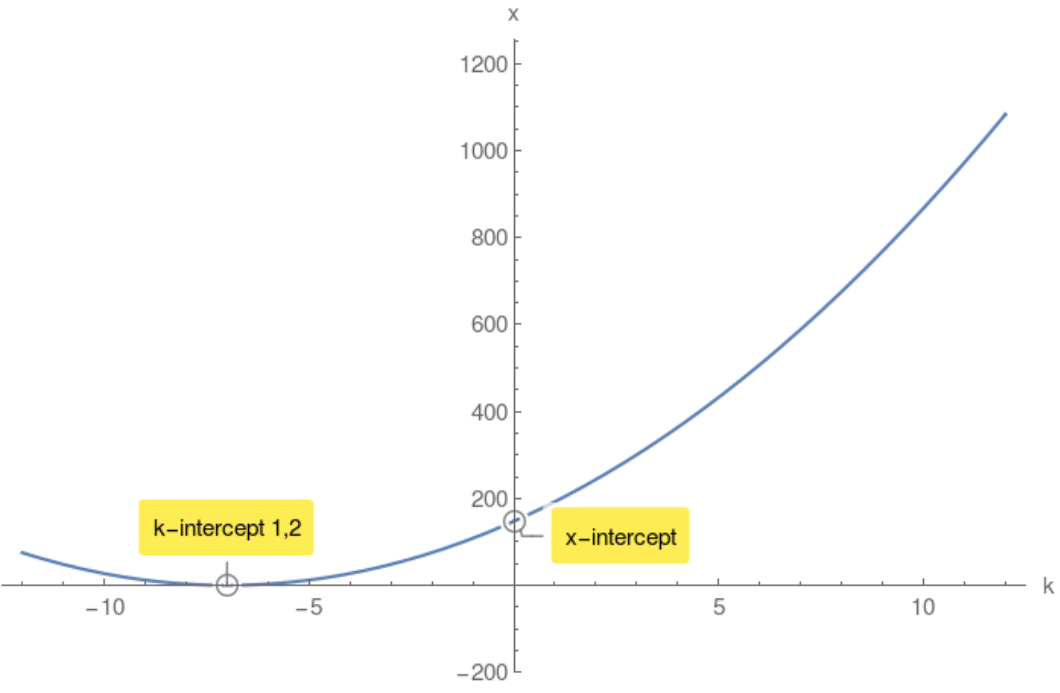
Example 2.

$x(k)=3\,k^2+42\,k+147$ compute its discriminant $\triangle$:

$\triangle=0$

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

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



Case3: $\triangle<0$

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

However there is a x-intercept.

Example 3.

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

$\triangle=-1764<0$

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