Intercepts of the Quadratic

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

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

Case1: $\triangle>0$

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

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

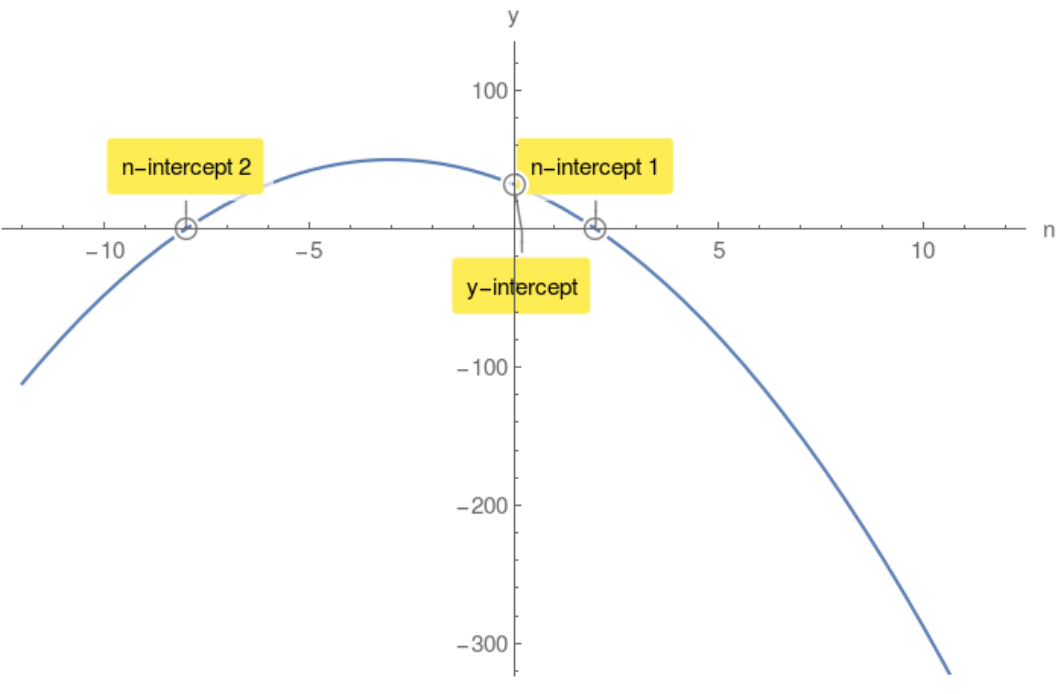
Example 1.

$y(n)=-2\,n^2-12\,n+32$ compute its discriminant $\triangle$:

$\triangle=400>0$

$n_{1,2}=2,-8$

$y(0)=32$ y-intercept.



Case2: $\triangle=0$

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

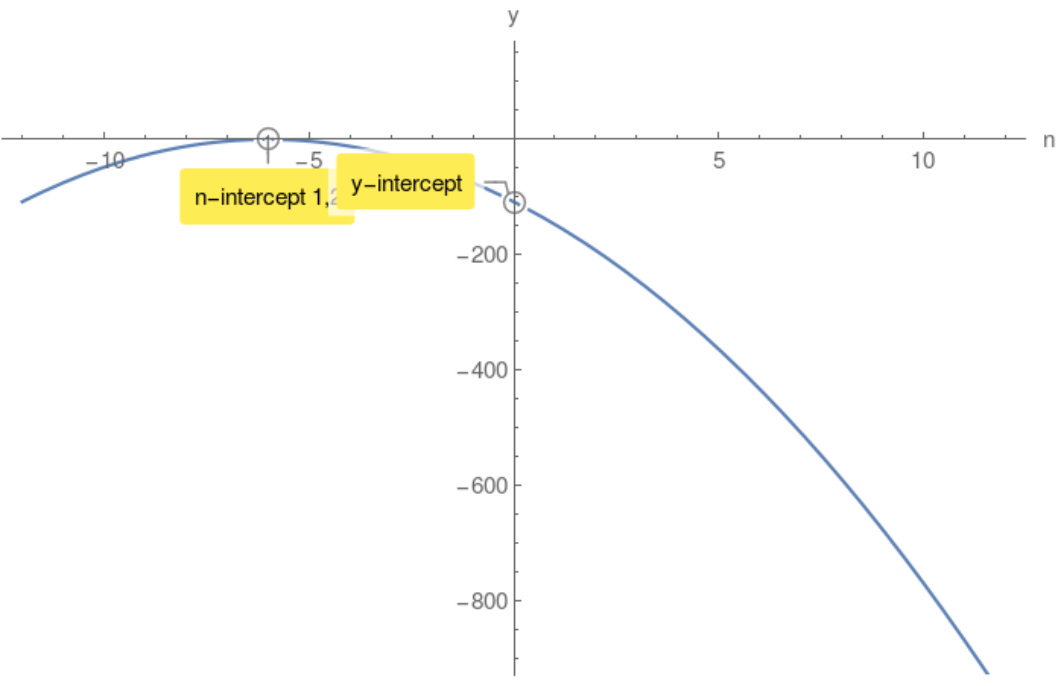
Example 2.

$y(n)=-3\,n^2-36\,n-108$ compute its discriminant $\triangle$:

$\triangle=0$

$n_{1,2}=-6,-6$

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



Case3: $\triangle<0$

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

However there is a y-intercept.

Example 3.

$y(n)=-9\,n^2-144\,n-640$ compute its discriminant $\triangle$:

$\triangle=-2304<0$

$y(0)=-640$ y-intercept.