Intercepts of the Quadratic

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

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

Case1: $\triangle>0$

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

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

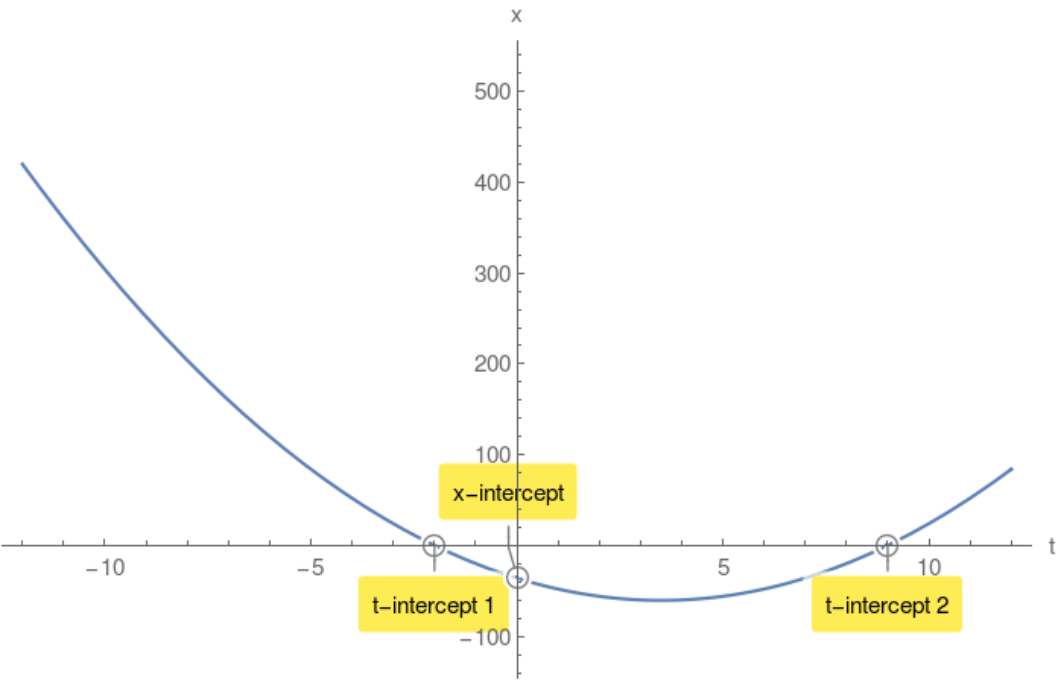
Example 1.

$x(t)=2\,t^2-14\,t-36$ compute its discriminant $\triangle$:

$\triangle=484>0$

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

$x(0)=-36$ x-intercept.



Case2: $\triangle=0$

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

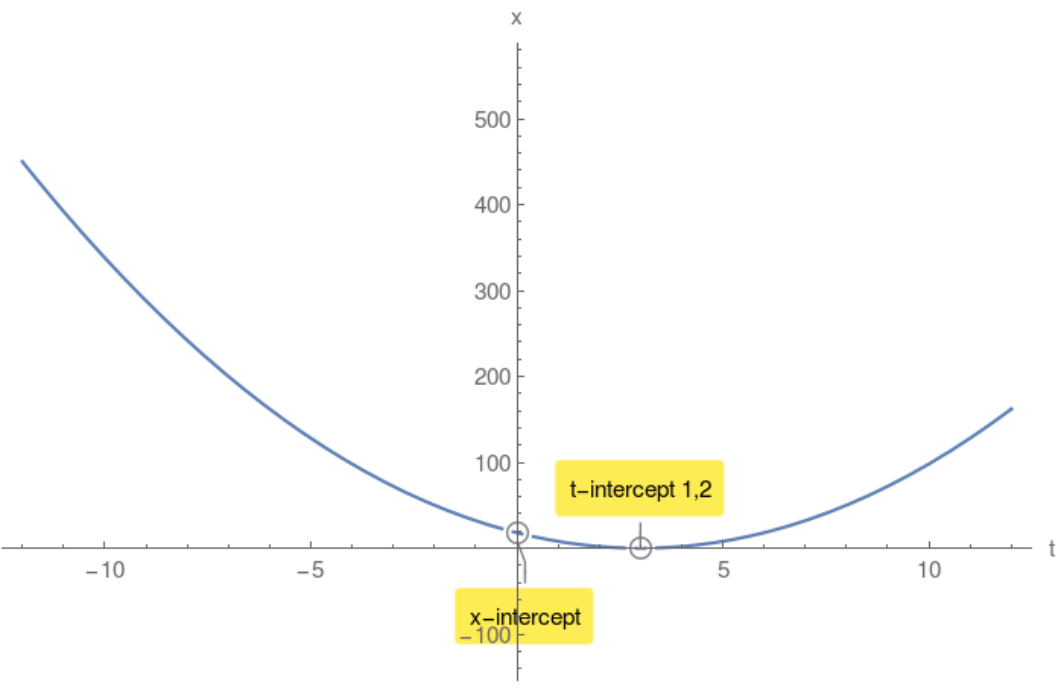
Example 2.

$x(t)=2\,t^2-12\,t+18$ compute its discriminant $\triangle$:

$\triangle=0$

$t_{1,2}=3,3$

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



Case3: $\triangle<0$

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

However there is a x-intercept.

Example 3.

$x(t)=9\,t^2-180\,t+1000$ compute its discriminant $\triangle$:

$\triangle=-3600<0$

$x(0)=1000$ x-intercept.