# Intercepts of the Quadratic

Given a quadratic $r(t)=a\,t^2+b\,t+c$ 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.

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

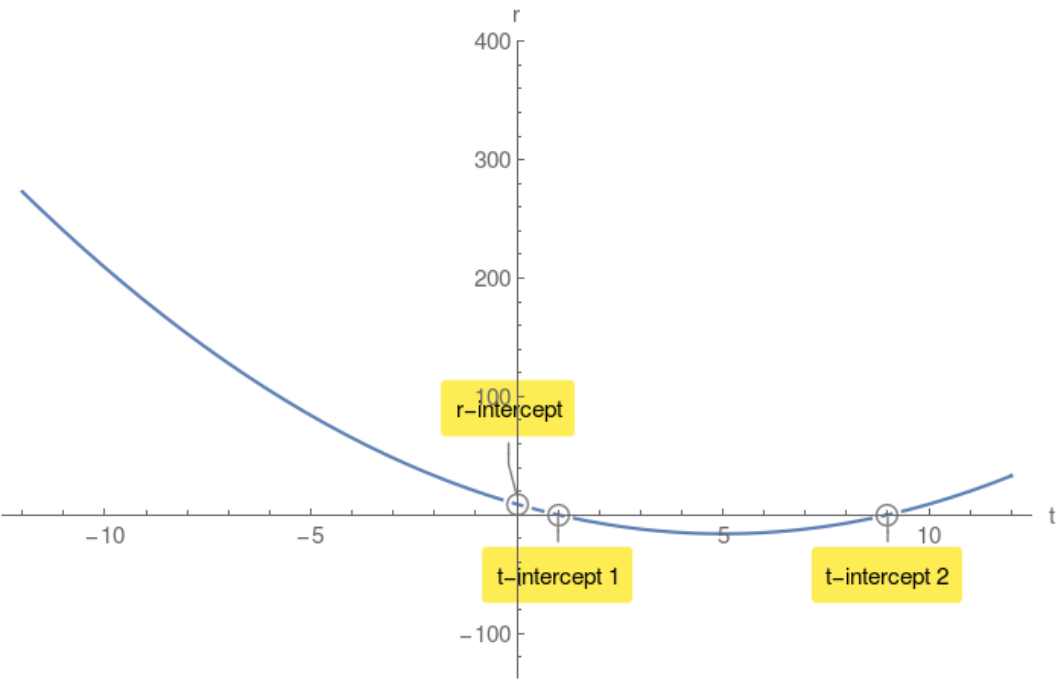
## Example 1.

$r(t)=t^2-10\,t+9$ compute its discriminant $\triangle$:

$\triangle=64>0$

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

$r(0)=9$ r-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.

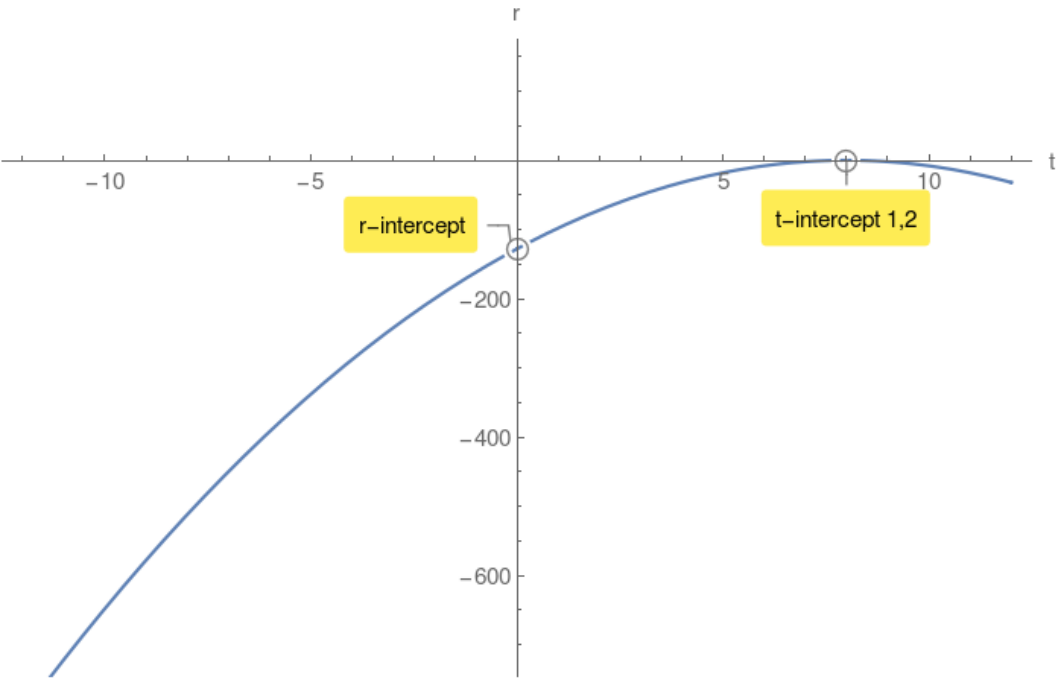
## Example 2.

$r(t)=-2\,t^2+32\,t-128$ compute its discriminant $\triangle$:

$\triangle=0$

$t_{1,2}=8,8$

$r(0)=-128$ r-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 r-intercept.

## Example 3.

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

$\triangle=-3600<0$

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