Intercepts of the Quadratic

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

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

Case1: $\triangle>0$

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

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

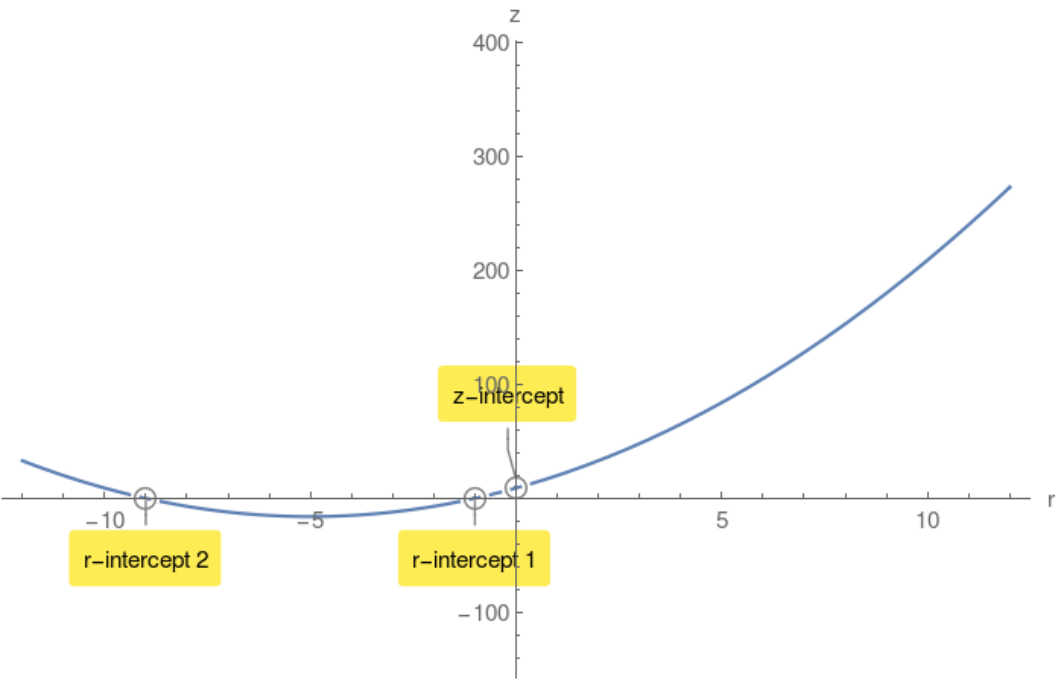
Example 1.

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

$\triangle=64>0$

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

$z(0)=9$ z-intercept.



Case2: $\triangle=0$

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

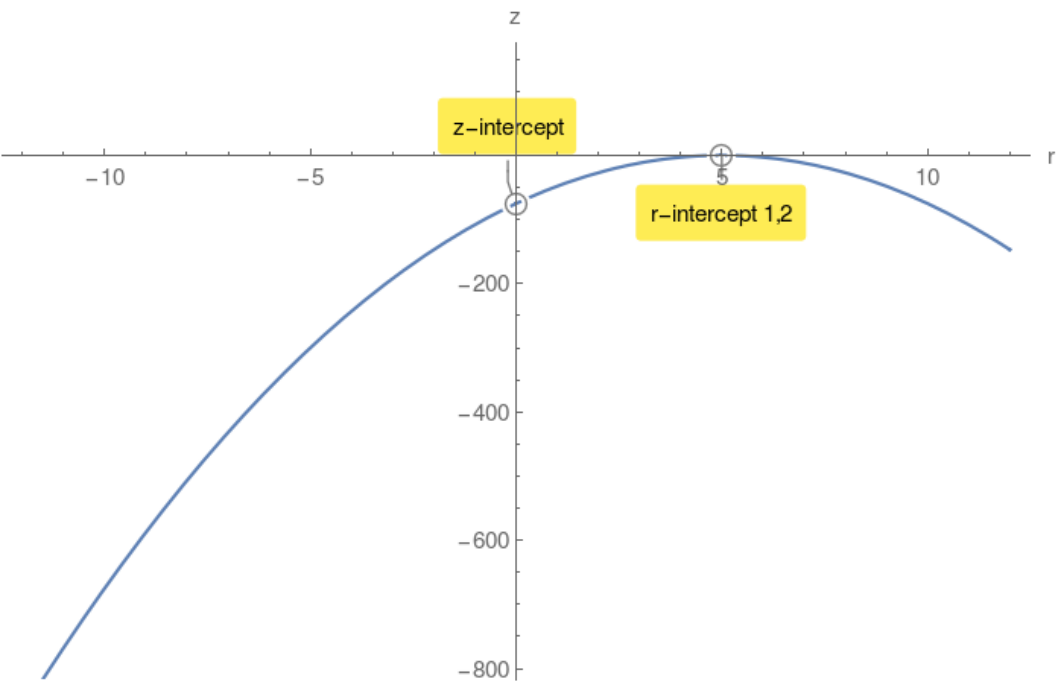
Example 2.

$z(r)=-3\,r^2+30\,r-75$ compute its discriminant $\triangle$:

$\triangle=0$

$r_{1,2}=5,5$

$z(0)=-75$ z-intercept.



Case3: $\triangle<0$

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

However there is a z-intercept.

Example 3.

$z(r)=-4\,r^2-72\,r-405$ compute its discriminant $\triangle$:

$\triangle=-1296<0$

$z(0)=-405$ z-intercept.