Intercepts of the Quadratic

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

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

Case1: $\triangle>0$

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

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

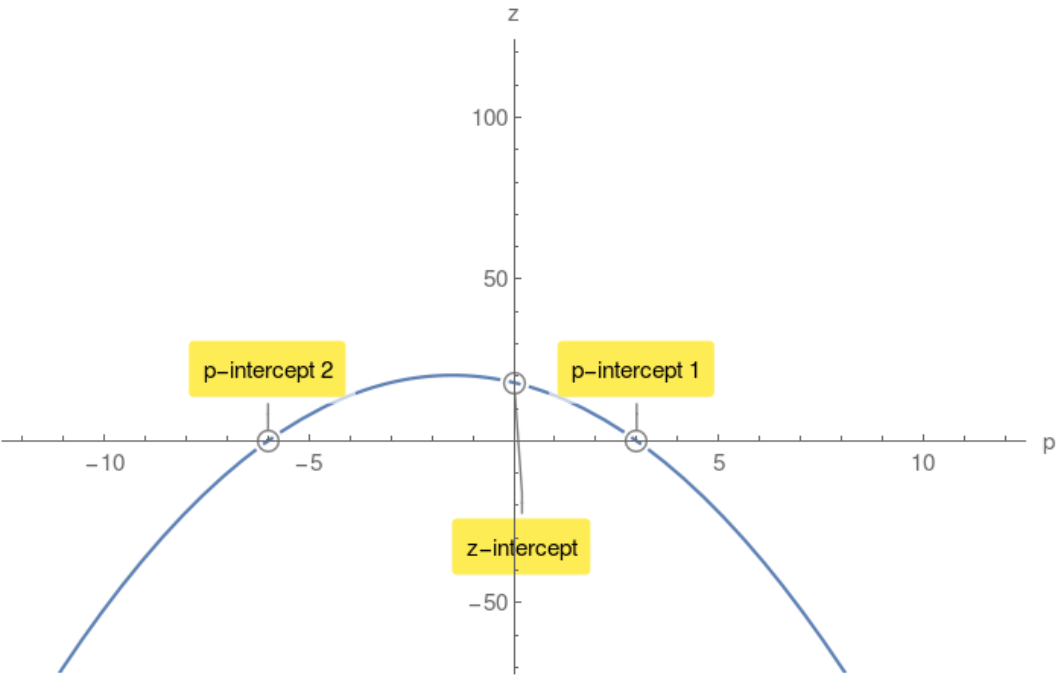
Example 1.

$z(p)=-p^2-3\,p+18$ compute its discriminant $\triangle$:

$\triangle=81>0$

$p_{1,2}=3,-6$

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



Case2: $\triangle=0$

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

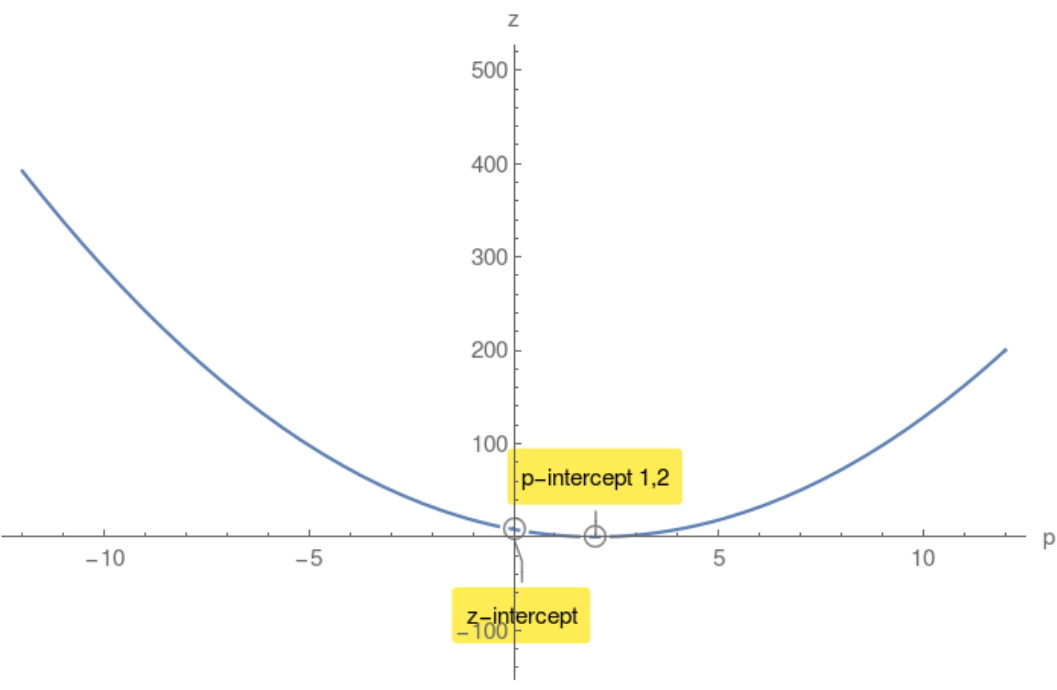
Example 2.

$z(p)=2\,p^2-8\,p+8$ compute its discriminant $\triangle$:

$\triangle=0$

$p_{1,2}=2,2$

$z(0)=8$ z-intercept.



Case3: $\triangle<0$

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

However there is a z-intercept.

Example 3.

$z(p)=-4\,p^2-56\,p-245$ compute its discriminant $\triangle$:

$\triangle=-784<0$

$z(0)=-245$ z-intercept.