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.

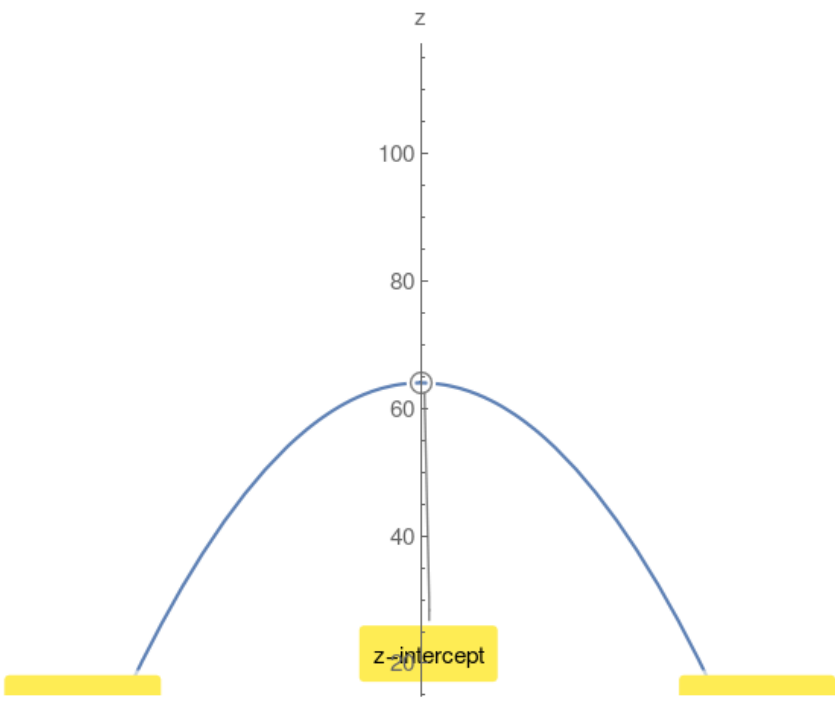
Example 1.

$z(p)=64-p^2$ compute its discriminant $\triangle$:

$\triangle=256>0$

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

$z(0)=64$ 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.

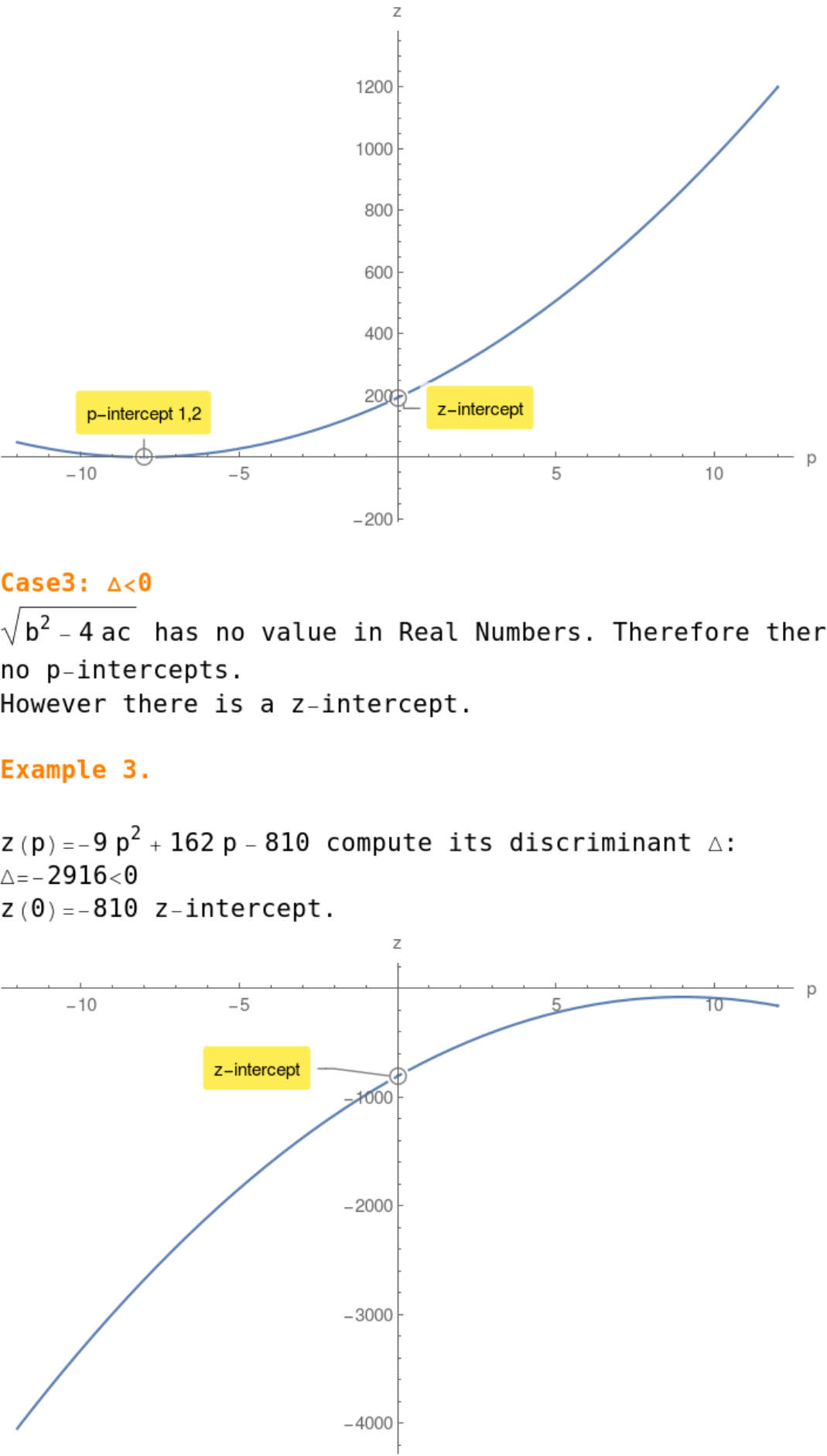
Example 2.

$z(p)=3\,p^2+48\,p+192$ compute its discriminant $\triangle$:

$\triangle=0$

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

$z(0)=192$ 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.

$z(p)=-9\,p^2+162\,p-810$ compute its discriminant $\triangle$:

$\triangle=-2916<0$

$z(0)=-810$ z-intercept.