Intercepts of the Quadratic

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

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

Case1: $\triangle > 0$

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

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

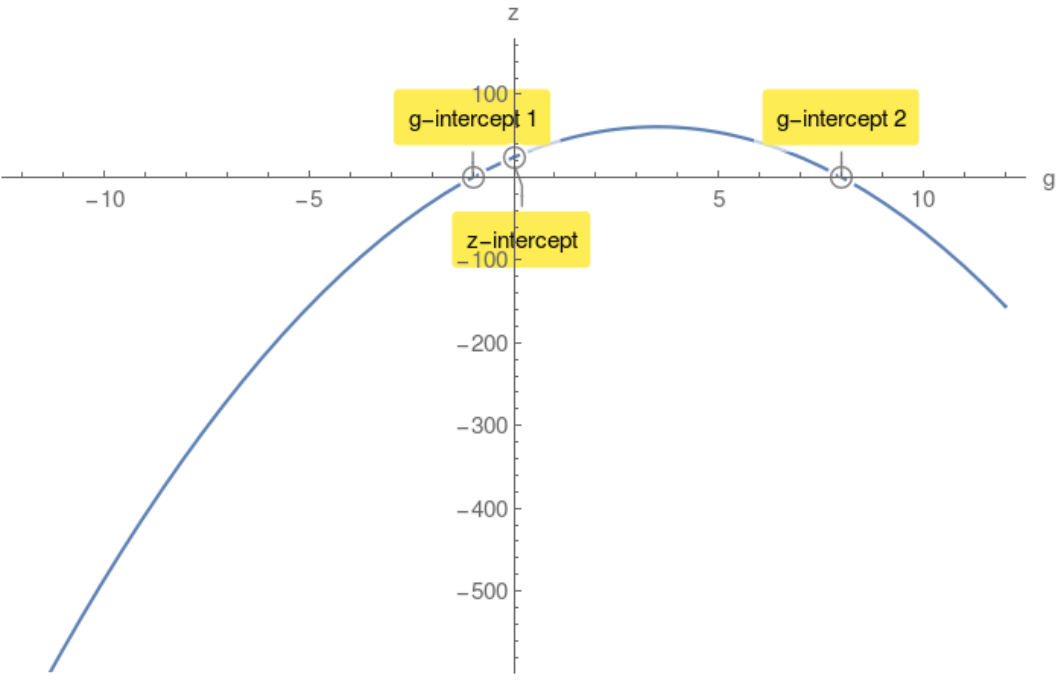
Example 1.

$z(g) = -3\,g^2 + 21\,g + 24$ compute its discriminant $\triangle$:

$\triangle = 729 > 0$

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

$z(0) = 24$ z-intercept.



Case2: $\triangle = 0$

$g_{1,2} = \frac{-b \pm \sqrt{b^2 - 4\,ac}}{2a} = \frac{-b \pm 0}{2a} = \frac{-b}{2a}$ single g-intercept of multiplicity 2.

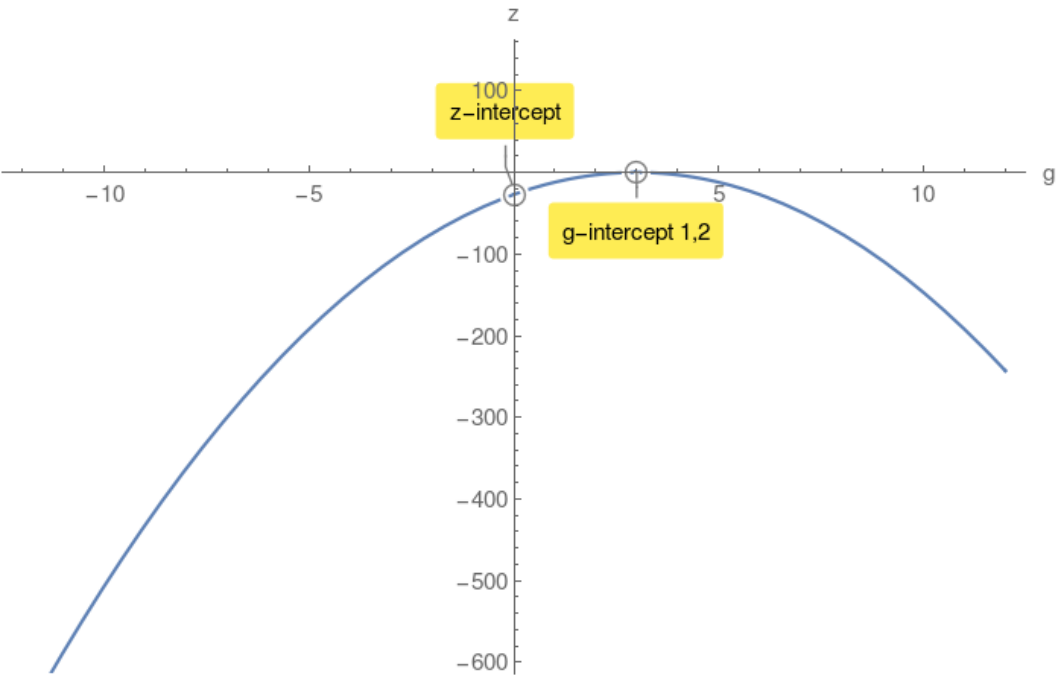
Example 2.

$z(g) = -3\,g^2 + 18\,g - 27$ compute its discriminant $\triangle$:

$\triangle = 0$

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

$z(0) = -27$ z-intercept.



Case3: $\triangle < 0$

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

However there is a z-intercept.

Example 3.

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

$\triangle = -2916 < 0$

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