Intercepts of the Quadratic

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

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

Case1: $\triangle > 0$

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

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

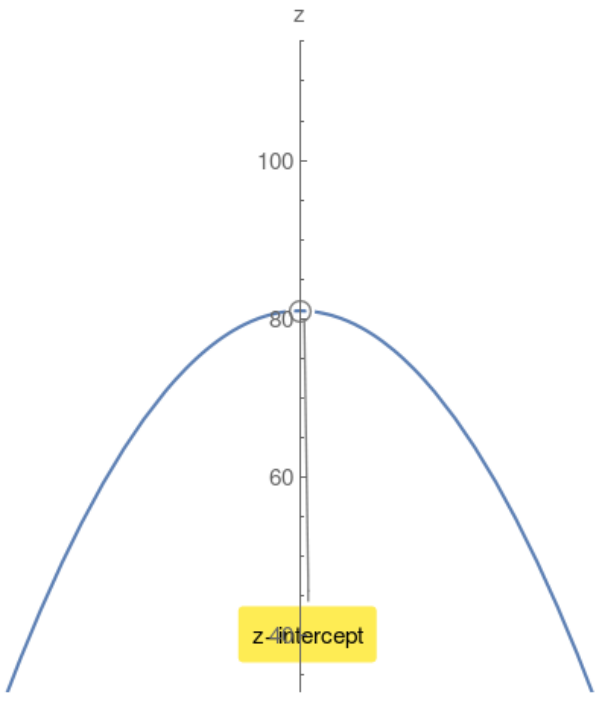
Example 1.

$z(m) = 81 - m^2$ compute its discriminant $\triangle$:

$\triangle = 324 > 0$

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

$z(0) = 81$ z-intercept.



Case2: $\triangle = 0$

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

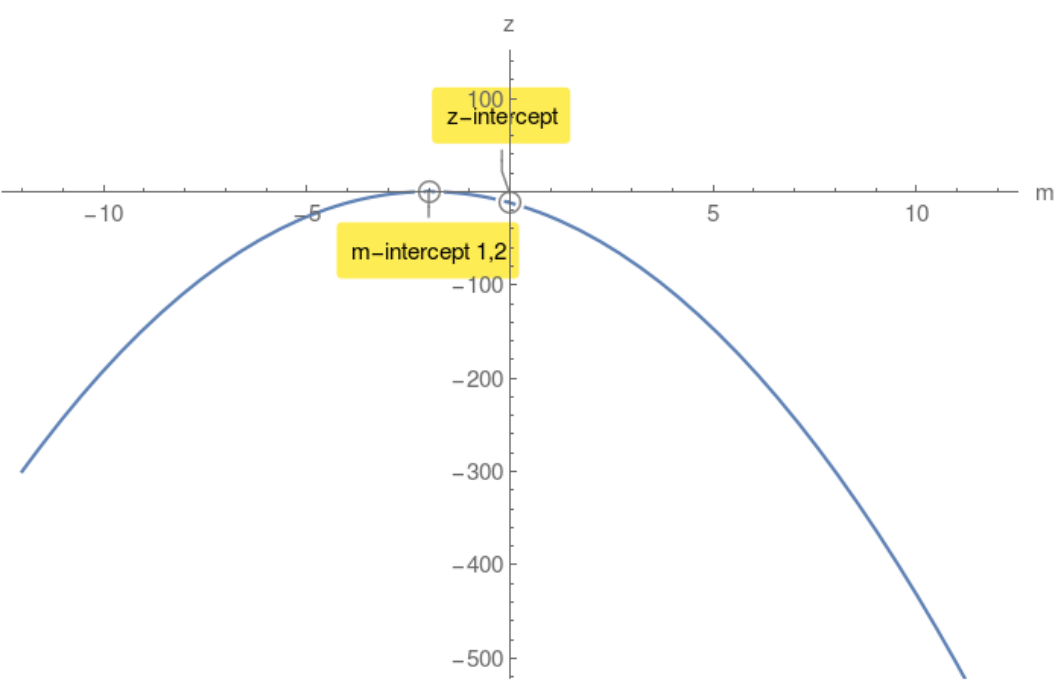
Example 2.

$z(m) = -3\,m^2 - 12\,m - 12$ compute its discriminant $\triangle$:

$\triangle = 0$

$m_{1,2} = -2, -2$

$z(0) = -12$ z-intercept.



Case3: $\triangle < 0$

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

However there is a z-intercept.

Example 3.

$z(m) = -9\,m^2 - 144\,m - 640$ compute its discriminant $\triangle$:

$\triangle = -2304 < 0$

$z(0) = -640$ z-intercept.