Intercepts of the Quadratic

Given a quadratic $r(m) = a\,m^2 + b\,m + c$ 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.

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

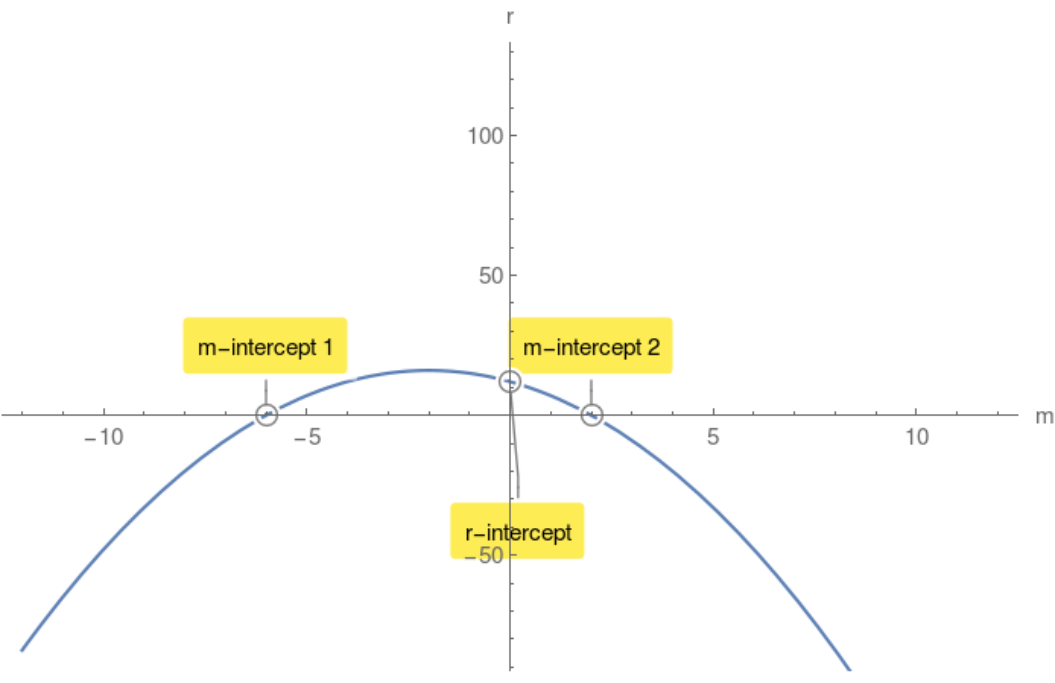
Example 1.

$r(m) = -m^2 - 4\,m + 12$ compute its discriminant $\triangle$:

$\triangle = 64 > 0$

$m_{1,2} = -6, 2$

$r(0) = 12$ r-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.

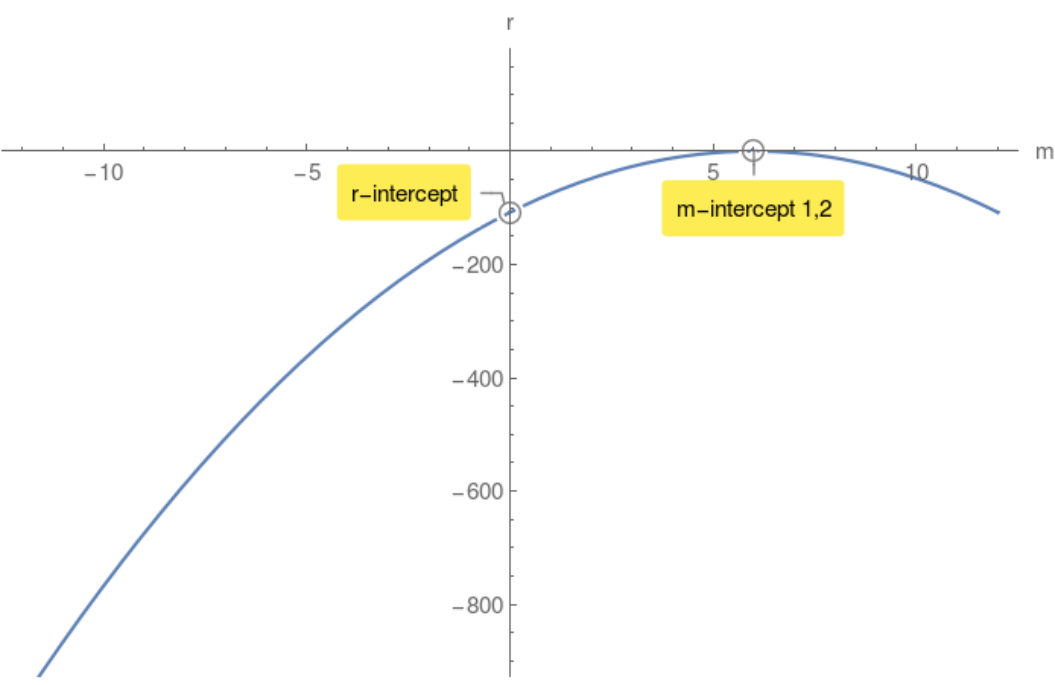
Example 2.

$r(m) = -3\,m^2 + 36\,m - 108$ compute its discriminant $\triangle$:

$\triangle = 0$

$m_{1,2} = 6, 6$

$r(0) = -108$ r-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 r-intercept.

Example 3.

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

$\triangle = -2304 < 0$

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