Intercepts of the Quadratic

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

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

Case1: $\triangle > 0$

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

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

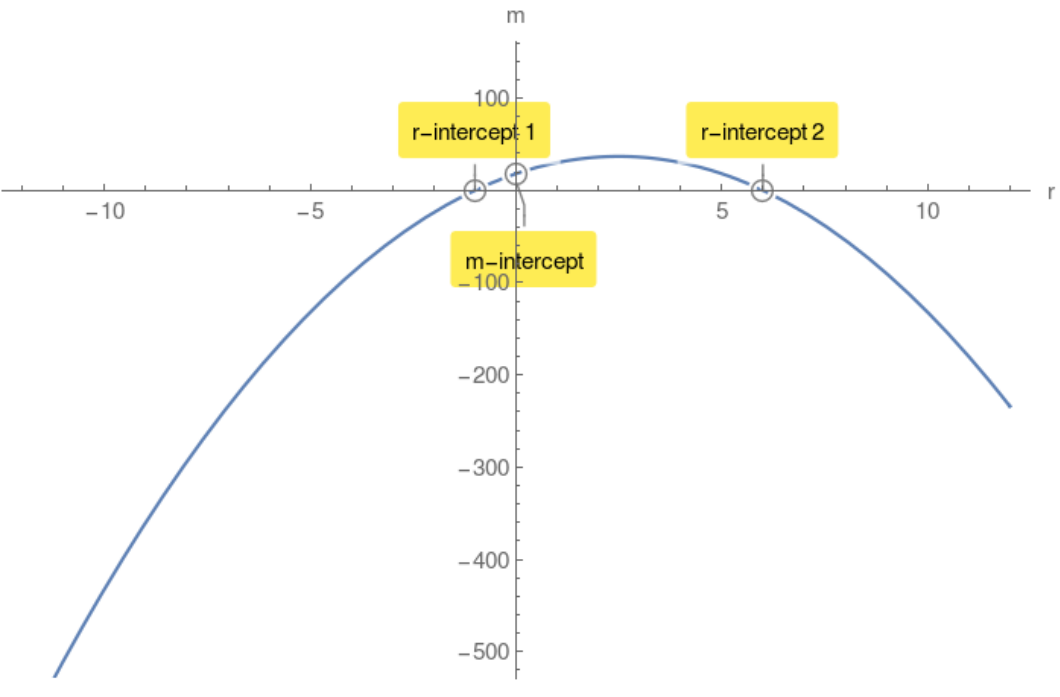
Example 1.

$m(r) = -3\,r^2 + 15\,r + 18$ compute its discriminant $\triangle$:

$\triangle = 441 > 0$

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

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



Case2: $\triangle = 0$

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

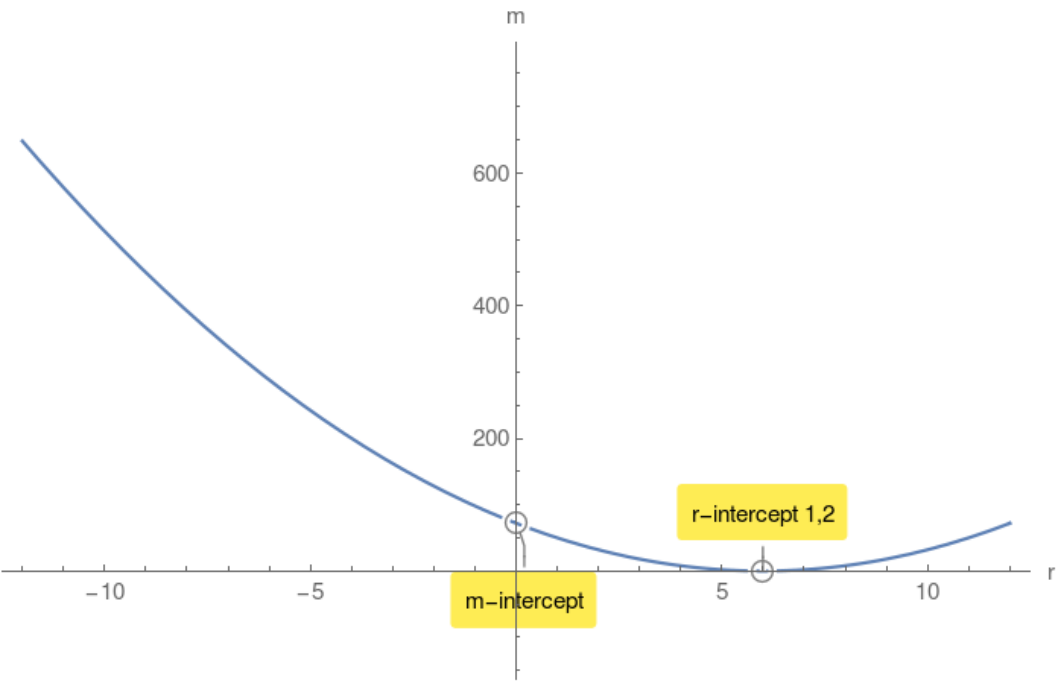
Example 2.

$m(r) = 2\,r^2 - 24\,r + 72$ compute its discriminant $\triangle$:

$\triangle = 0$

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

$m(0) = 72$ m-intercept.



Case3: $\triangle < 0$

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

However there is a m-intercept.

Example 3.

$m(r) = -4\,r^2 + 64\,r - 320$ compute its discriminant $\triangle$:

$\triangle = -1024 < 0$

$m(0) = -320$ m-intercept.