Intercepts of the Quadratic

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

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

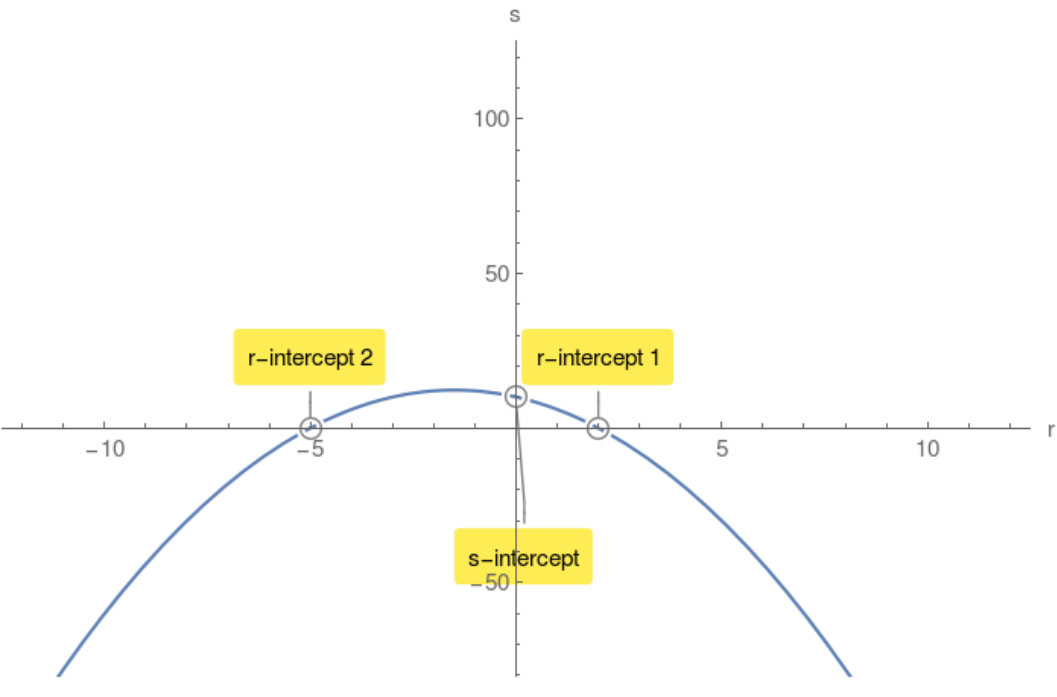
Example 1.

$s(r) = -r^2 - 3\,r + 10$ compute its discriminant $\triangle$:

$\triangle = 49 > 0$

$r_{1,2} = 2, -5$

$s(0) = 10$ s-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.

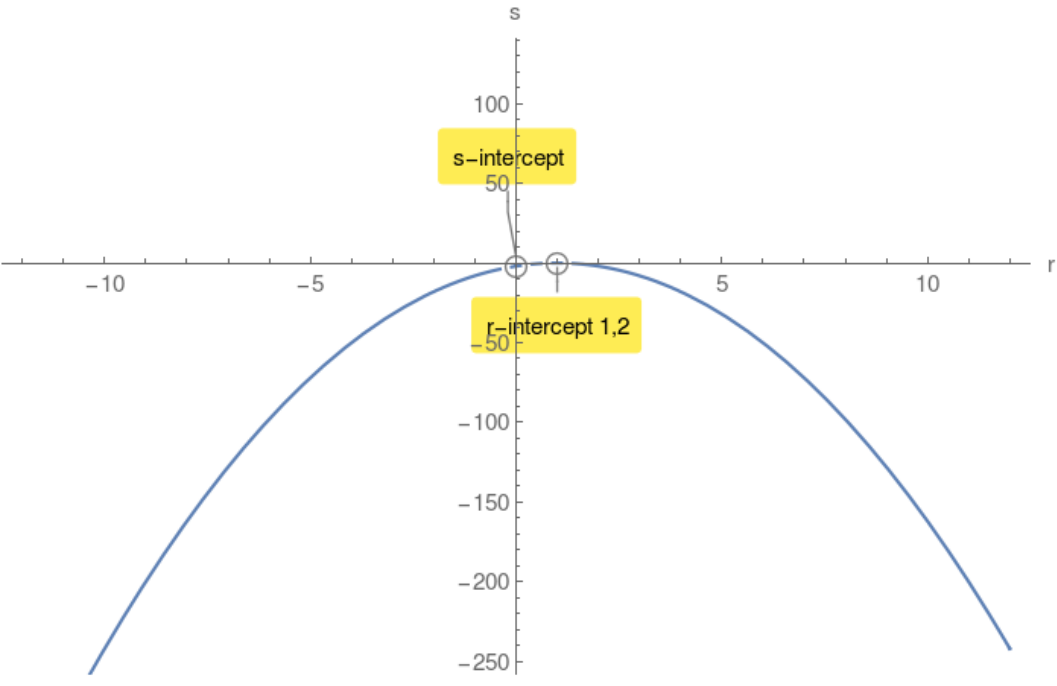
Example 2.

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

$\triangle = 0$

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

$s(0) = -2$ s-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 s-intercept.

Example 3.

$s(r) = -9\,r^2 + 126\,r - 490$ compute its discriminant $\triangle$:

$\triangle = -1764 < 0$

$s(0) = -490$ s-intercept.