Intercepts of the Quadratic

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

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

Case1: $\triangle > 0$

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

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

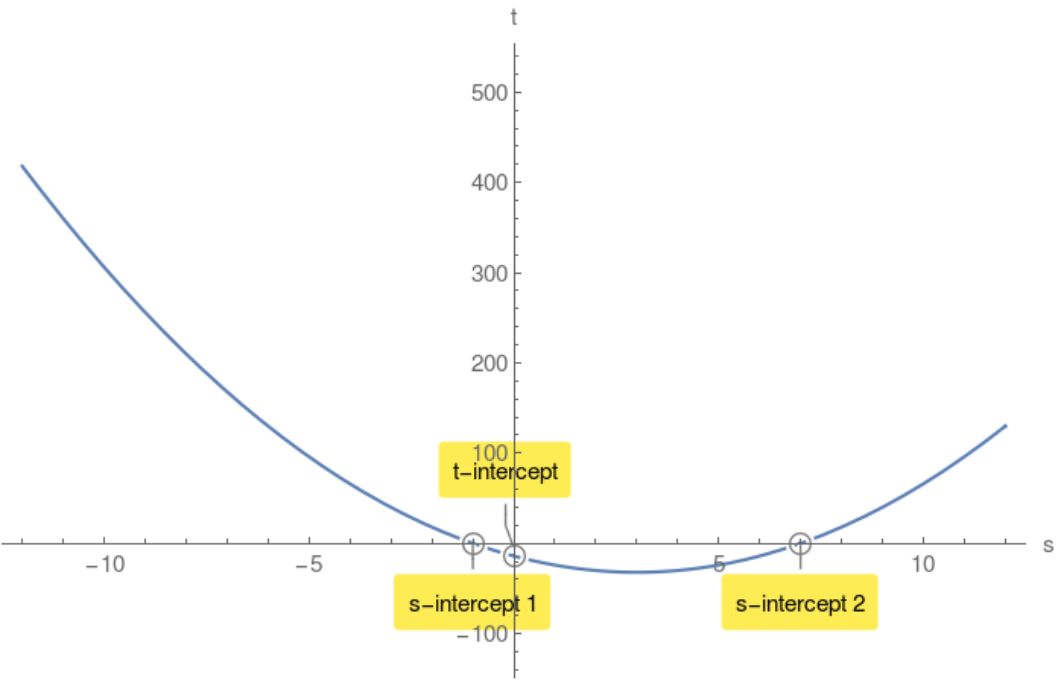
Example 1.

$t(s) = 2\,s^2 - 12\,s - 14$ compute its discriminant $\triangle$:

$\triangle = 256 > 0$

$s_{1,2} = -1, 7$

$t(0) = -14$ t-intercept.



Case2: $\triangle = 0$

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

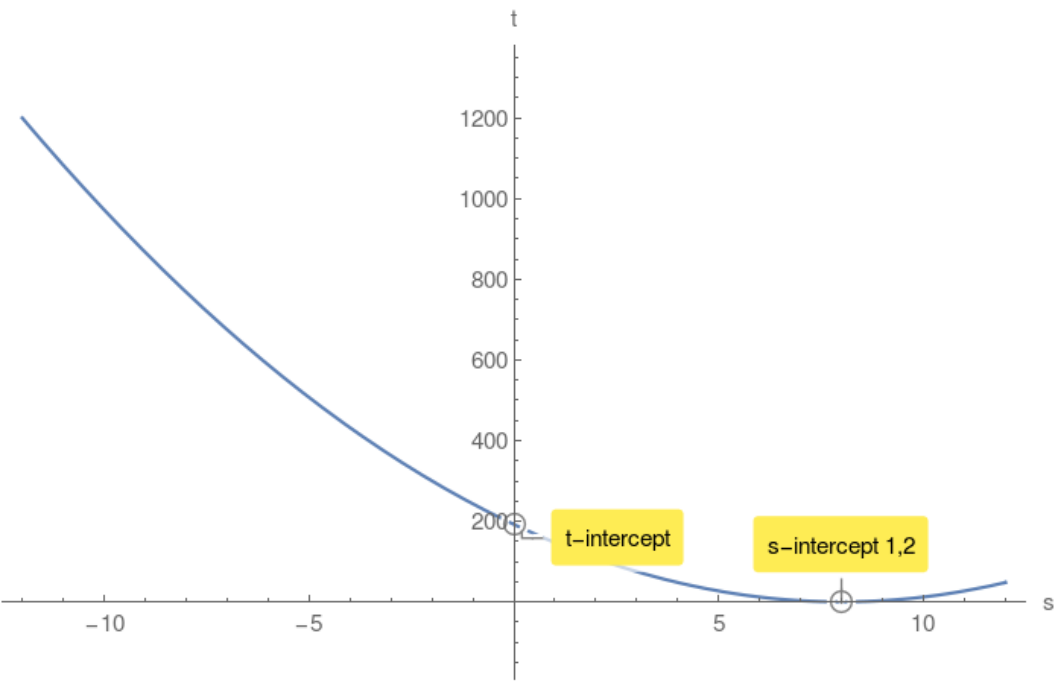
Example 2.

$t(s) = 3\,s^2 - 48\,s + 192$ compute its discriminant $\triangle$:

$\triangle = 0$

$s_{1,2} = 8, 8$

$t(0) = 192$ t-intercept.



Case3: $\triangle < 0$

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

However there is a t-intercept.

Example 3.

$t(s) = -9\,s^2 + 180\,s - 1000$ compute its discriminant $\triangle$:

$\triangle = -3600 < 0$

$t(0) = -1000$ t-intercept.