Intercepts of the Quadratic

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

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

Case1: $\triangle > 0$

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

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

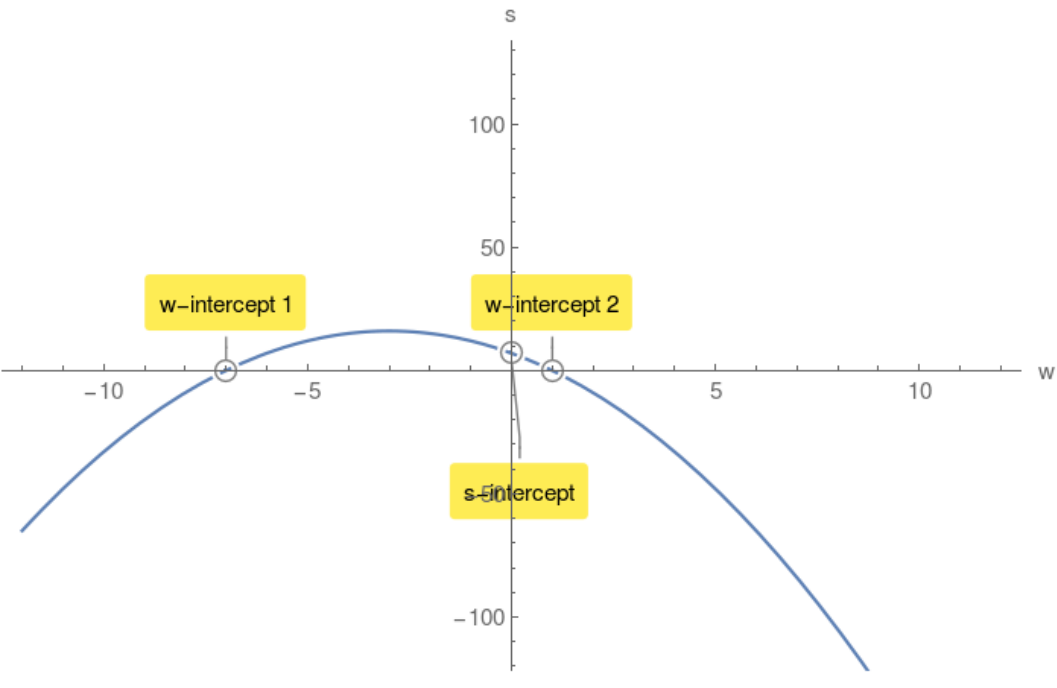
Example 1.

$s(w) = -w^2 - 6\,w + 7$ compute its discriminant $\triangle$:

$\triangle = 64 > 0$

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

$s(0) = 7$ s-intercept.



Case2: $\triangle = 0$

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

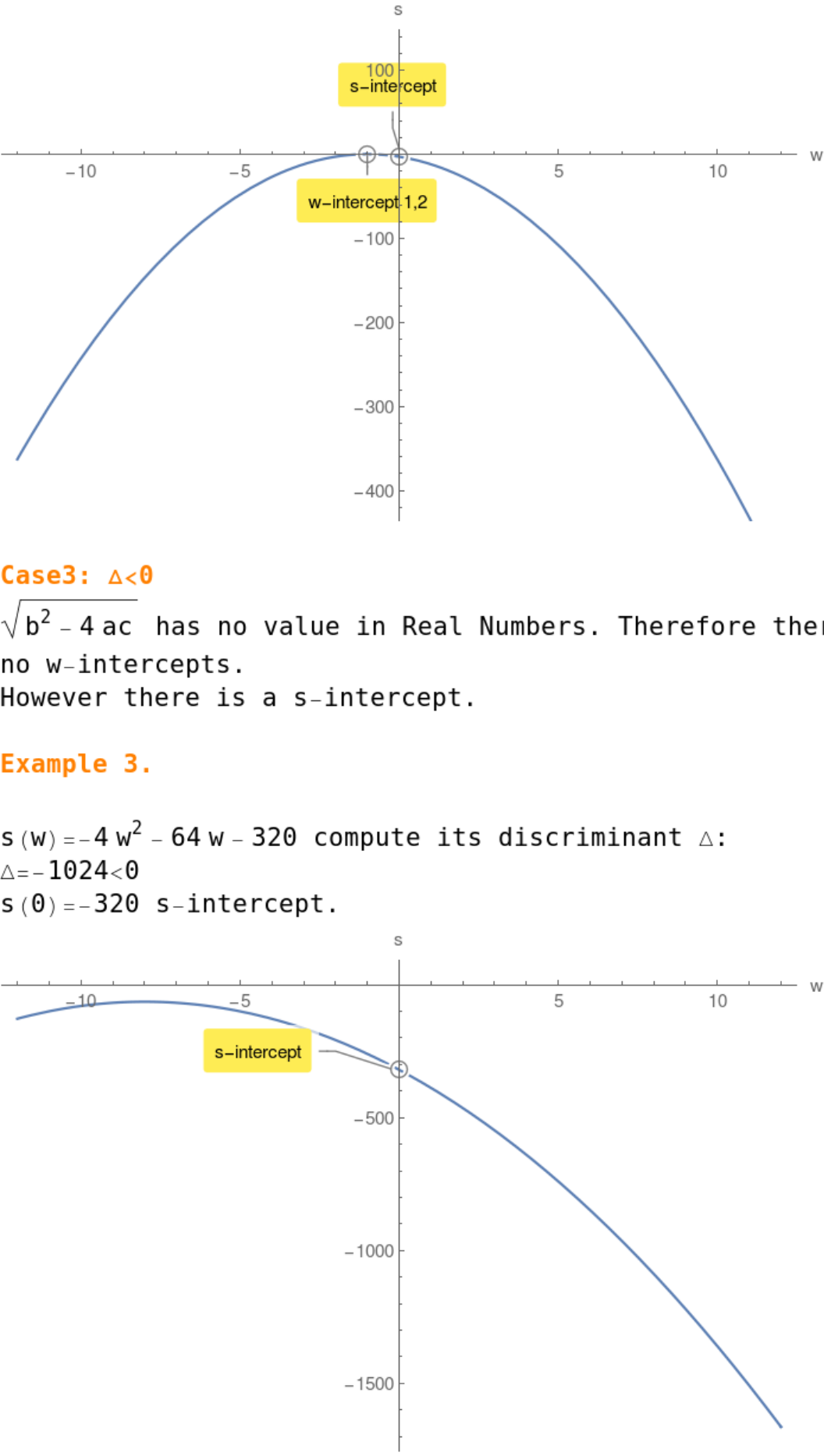
Example 2.

$s(w) = -3\,w^2 - 6\,w - 3$ compute its discriminant $\triangle$:

$\triangle = 0$

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

$s(0) = -3$ s-intercept.



Case3: $\triangle < 0$

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

However there is a s-intercept.

Example 3.

$s(w) = -4\,w^2 - 64\,w - 320$ compute its discriminant $\triangle$:

$\triangle = -1024 < 0$

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