Intercepts of the Quadratic

Given a quadratic $d(p) = a p^2 + b p + c$ compute its discriminant $\triangle$:

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

Case1: $\triangle > 0$

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

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

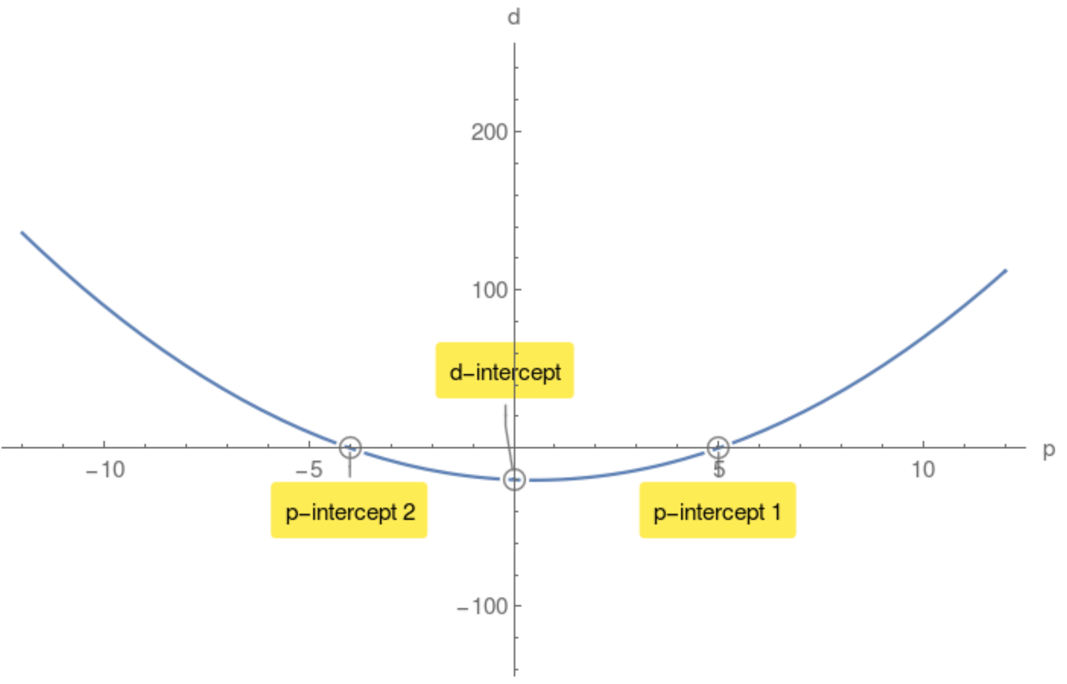
Example 1.

$d(p) = p^2 - p - 20$ compute its discriminant $\triangle$:

$\triangle = 81 > 0$

$p_{1,2} = 5, -4$

$d(0) = -20$ d-intercept.



Case2: $\triangle = 0$

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

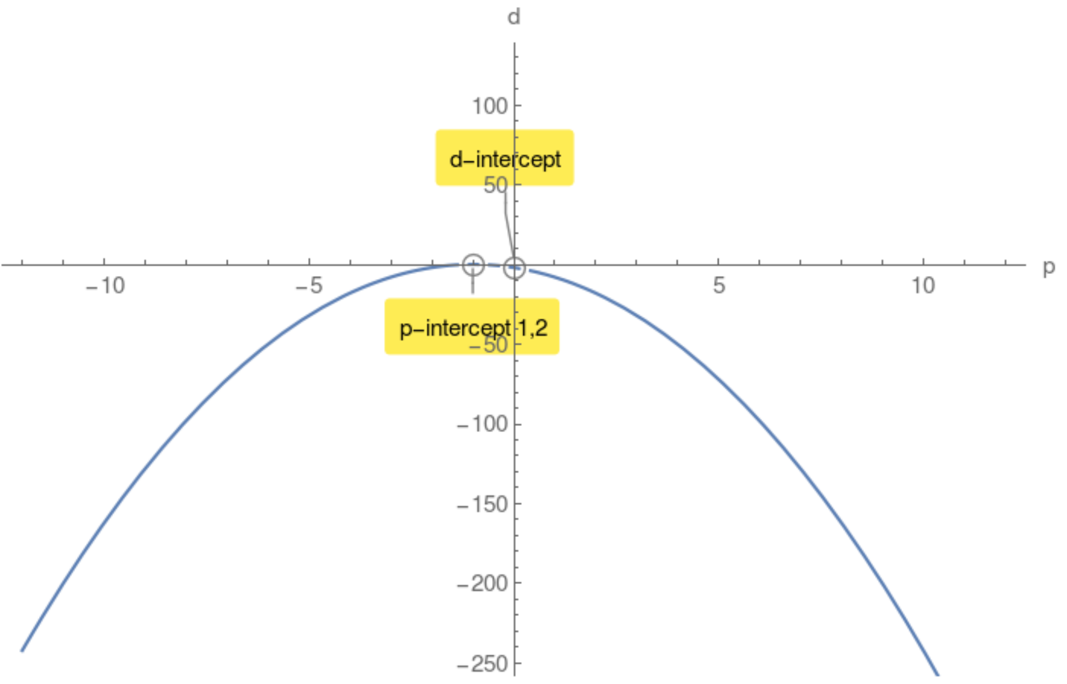
Example 2.

$d(p) = -2 p^2 - 4 p - 2$ compute its discriminant $\triangle$:

$\triangle = 0$

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

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



Case3: $\triangle < 0$

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

However there is a d-intercept.

Example 3.

$d(p) = 9 p^2 - 144 p + 640$ compute its discriminant $\triangle$:

$\triangle = -2304 < 0$

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