

Intercepts of the Quadratic

Given a quadratic $z(u) = a u^2 + b u + c$ compute its discriminant Δ :

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

Case1: $\Delta > 0$

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

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

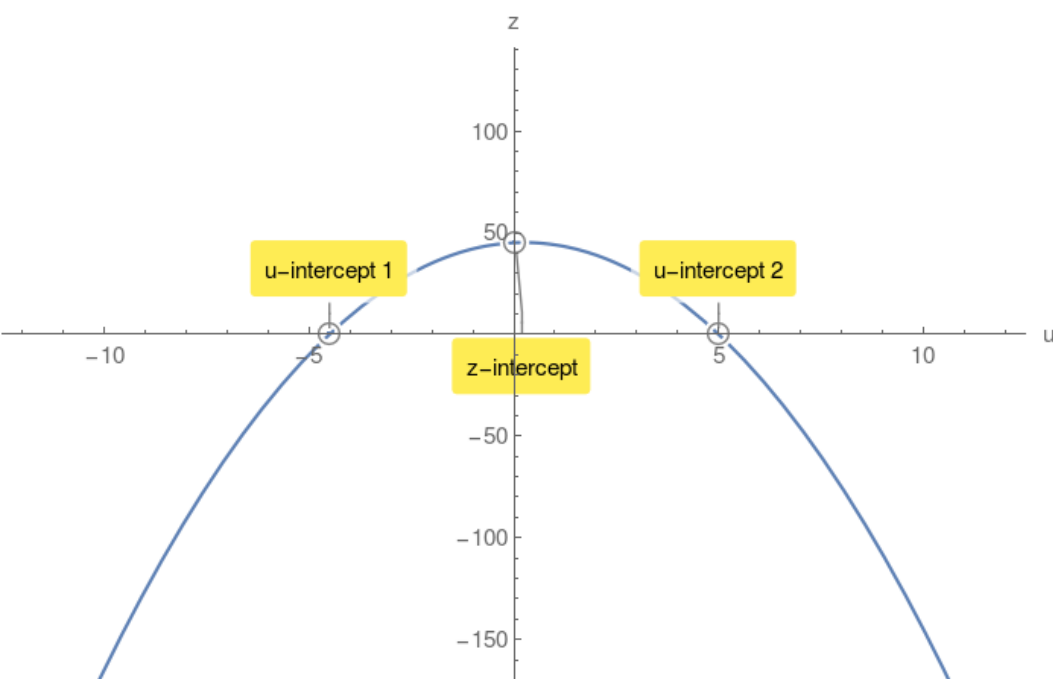
Example 1.

$z(u) = -2u^2 + u + 45$ compute its discriminant Δ :

$$\Delta = 361 > 0$$

$$u_{1,2} = -\frac{9}{2}, 5$$

$z(0) = 45$ z-intercept.



Case2: $\Delta = 0$

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

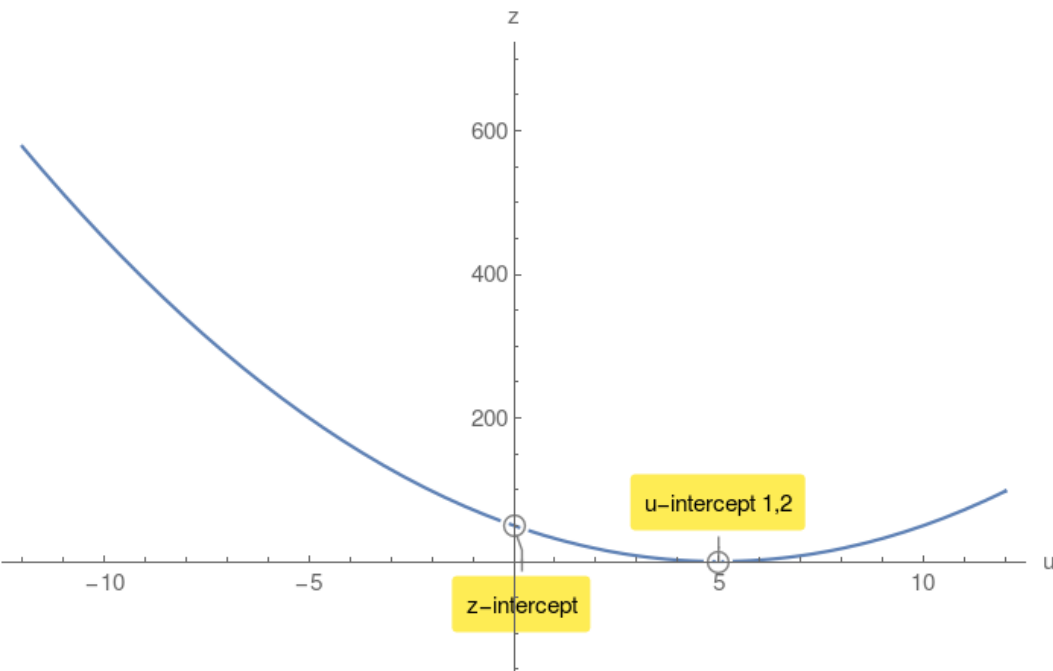
Example 2.

$z(u) = 2u^2 - 20u + 50$ compute its discriminant Δ :

$$\Delta = 0$$

$$u_{1,2} = 5, 5$$

$z(0) = 50$ z-intercept.



Case3: $\Delta < 0$

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

However there is a z-intercept.

Example 3.

$z(u) = 9u^2 - 180u + 1000$ compute its discriminant Δ :

$$\Delta = -3600 < 0$$

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

