

# Intercepts of the Quadratic

Given a quadratic  $r(u) = au^2 + bu + c$  compute its discriminant  $\Delta$ :

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

**Case1:  $\Delta > 0$**

$u_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$  computes the u-intercepts of multiplicity 1.  
 $r(0) = c$  computes the single r-intercept.

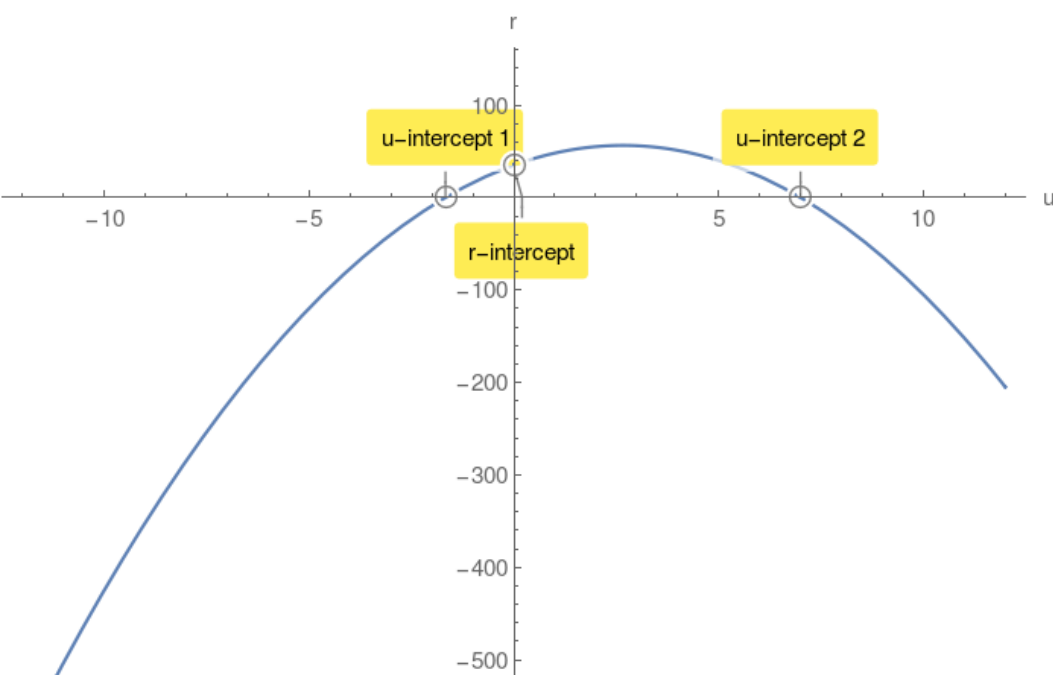
**Example 1.**

$r(u) = -3u^2 + 16u + 35$  compute its discriminant  $\Delta$ :

$$\Delta = 676 > 0$$

$$u_{1,2} = -\frac{5}{3}, 7$$

$r(0) = 35$  r-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.

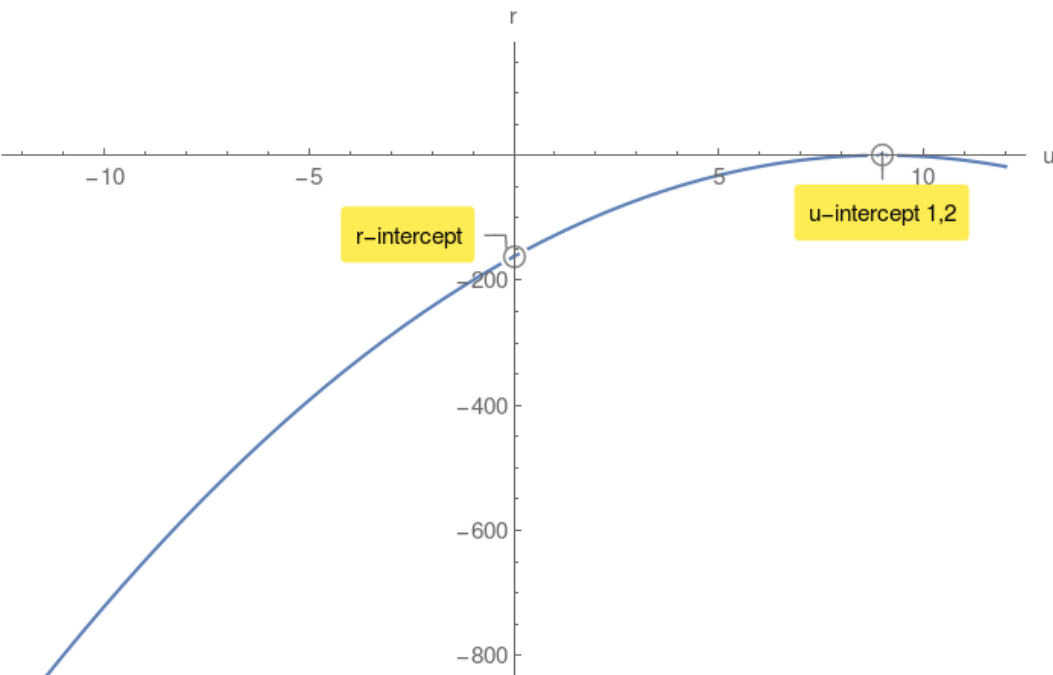
**Example 2.**

$r(u) = -2u^2 + 36u - 162$  compute its discriminant  $\Delta$ :

$$\Delta = 0$$

$$u_{1,2} = 9, 9$$

$r(0) = -162$  r-intercept.



**Case3:  $\Delta < 0$**

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

However there is a r-intercept.

**Example 3.**

$r(u) = 4u^2 + 72u + 405$  compute its discriminant  $\Delta$ :

$$\Delta = -1296 < 0$$

$r(0) = 405$  r-intercept.

