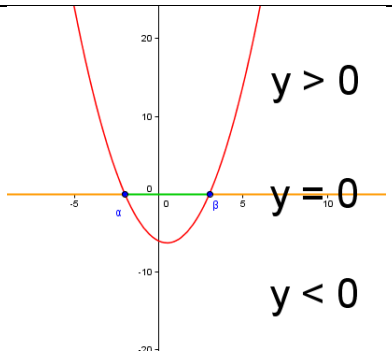
# Quadratic inequalities

The purpose of this part is to solve inequalities of the form

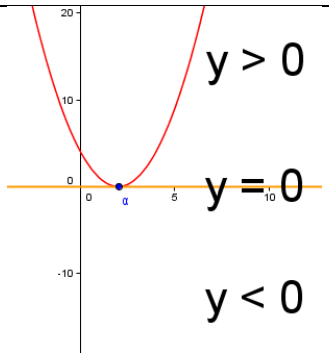
$ax^2+bx+c>0\ (\geq 0)$ *or* $ax^2+bx+c<0\ (\leq 0)$

| $b^2-4ac>0$ | $b^2-4ac=0$ | $b^2-4ac<0$ |
|---|---|---|
| $f(x)=ax^2+bx+c$<br>$f(x)=a(x-\alpha)(x-\beta)$ | $f(x)=ax^2+bx+c$<br>$f(x)=a(x-\alpha)^2$<br>The parabola is TANGENT to the $x$-*axis* | $f(x)=ax^2+bx+c$<br>$f(x)$ *can't be factorised*<br>The parabola does not cross the $x$-*axis*. |

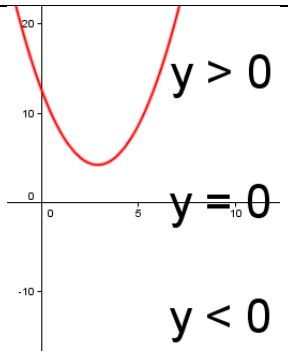
## $a>0$




$ax^2+bx+c>0$ *for* $x<\alpha$ *or* $x>\beta$
$ax^2+bx+c<0$ *for* $\alpha<x<\beta$
$ax^2+bx+c=0$ *for* $x=\alpha$ *or* $x=\beta$

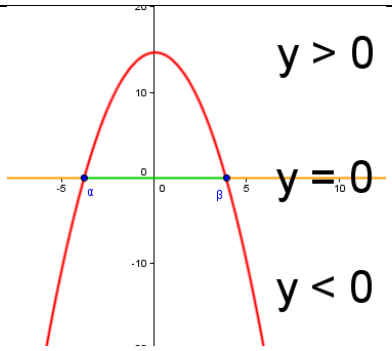



$ax^2+bx+c>0$ *for* $x<\alpha$ *or* $x>\alpha$
$ax^2+bx+c<0$ *has no solution*
$ax^2+bx+c=0$ *for* $x=\alpha$

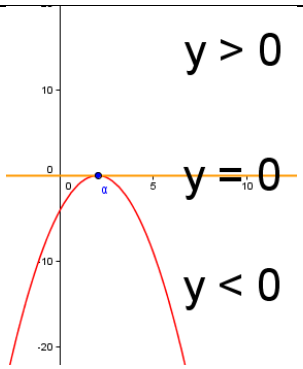



$ax^2+bx+c>0$ *for all* $x$

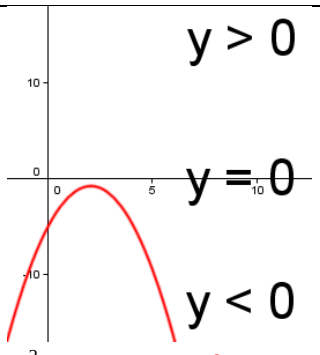
## $a<0$




$ax^2+bx+c>0$ *for* $\alpha<x<\beta$
$ax^2+bx+c<0$ *for* $x<\alpha$ *or* $x>\beta$
$ax^2+bx+c=0$ *for* $x=\alpha$ *or* $x=\beta$




$ax^2+bx+c>0$ *has no solution*
$ax^2+bx+c<0$ *for* $x<\alpha$ *or* $x>\alpha$
$ax^2+bx+c=0$ *for* $x=\alpha$




$ax^2+bx+c<0$ *for all* $x$