Conics and Inequalities

Goal:

- to graph the region described by a conic inequality

- to determine whether or not a point belongs to the region described by a conic inequality

All the points located on a conic are represented by its equation.

For example: Is the point (6,8) located on the circle $x^2+y^2=100$?

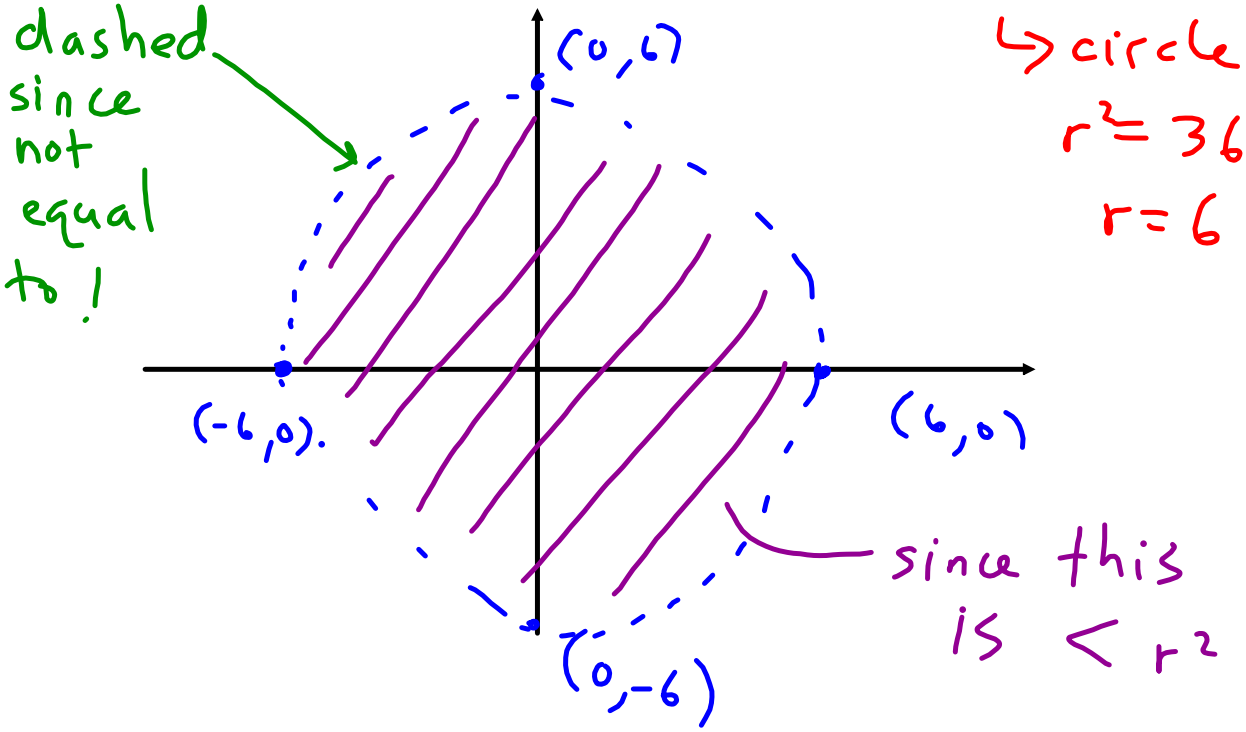
Test: 6^2+8^2

$=36+64$

$=100$ ✓

When using an inequality instead of an equation all the points inside (or outside) the conic are being represented.

For example: Graph the region represented by $x^2+y^2<36$.

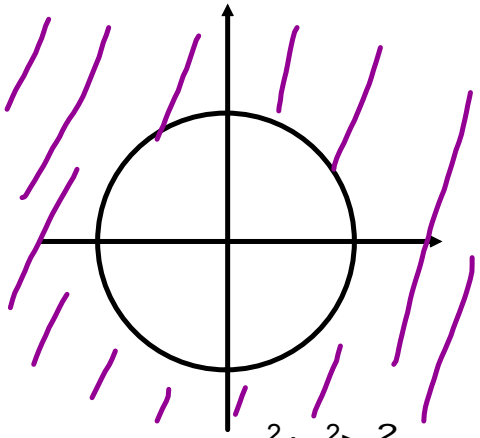


For circles and ellipses the inequality can be more easily understood.

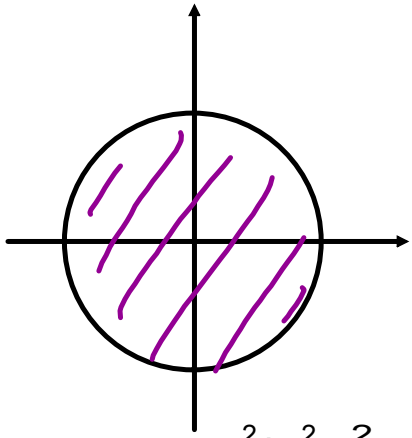
↳ shortcut

less than = inside

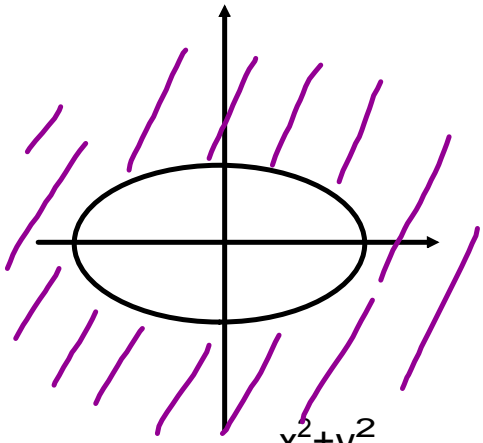
greater than = outside



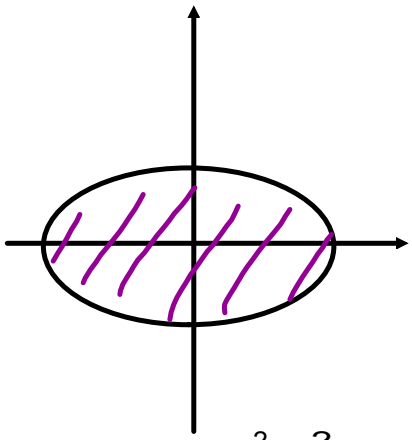
$x^2+y^2 \geq r^2$



$x^2+y^2 \leq r^2$

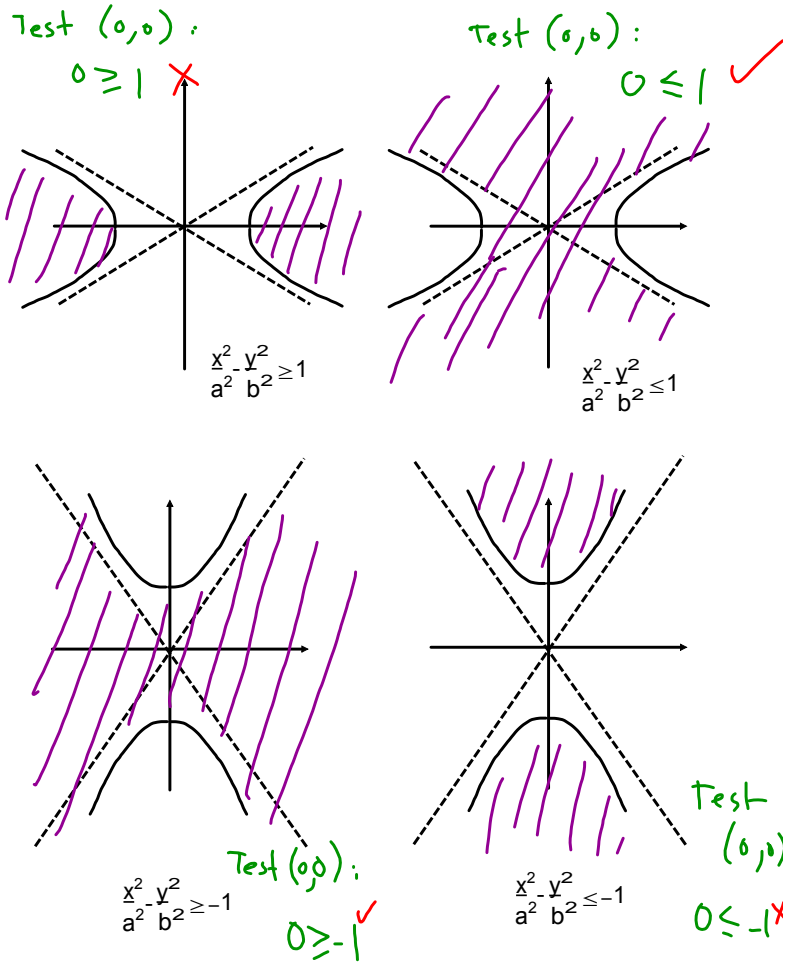


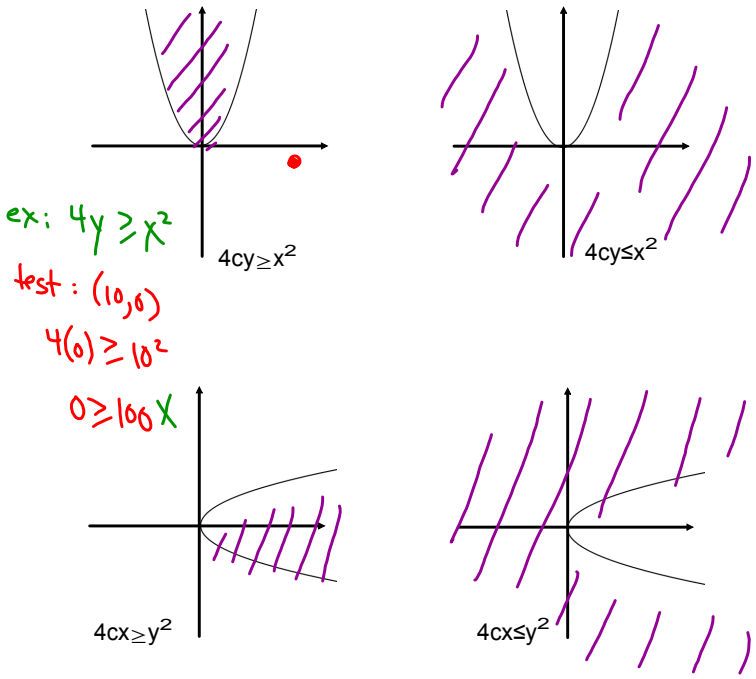
$\frac{x^2}{a^2}+\frac{y^2}{b^2} \geq 1$



$\frac{x^2}{a^2}+\frac{y^2}{b^2} \leq 1$

For hyperbolas and parabolas it may not be as obvious.
In this case we test a point.





8.b) $9x^2 + 4y^2 - 16 \geq 0$

$$\frac{9x^2}{16} + \frac{4y^2}{16} \geq \frac{16}{16}$$

$$\frac{x^2}{\frac{16}{9}} + \frac{y^2}{4} \geq 1$$

$a^2 = \frac{16}{9}$ $a = \frac{4}{3}$

$b^2 = 4$ $b = 2$