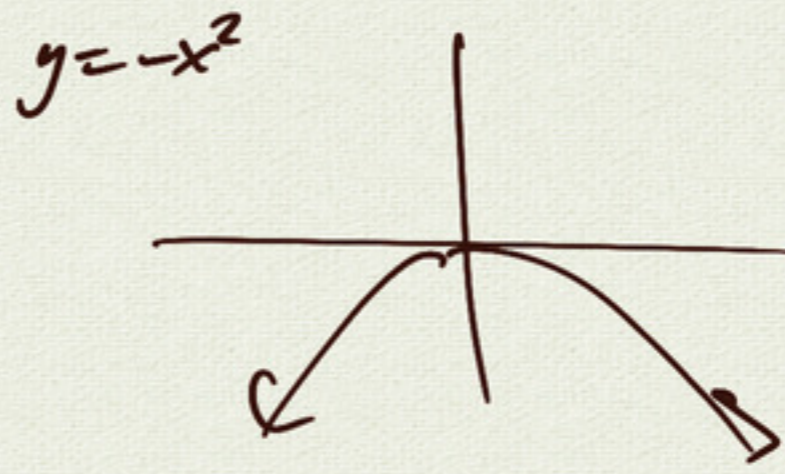
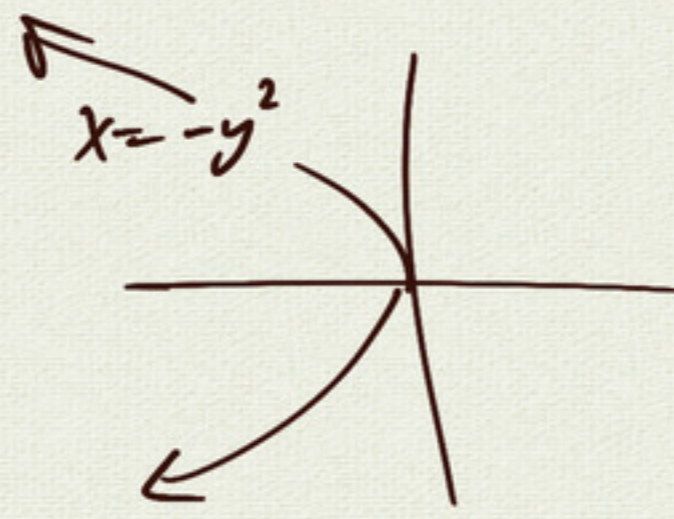
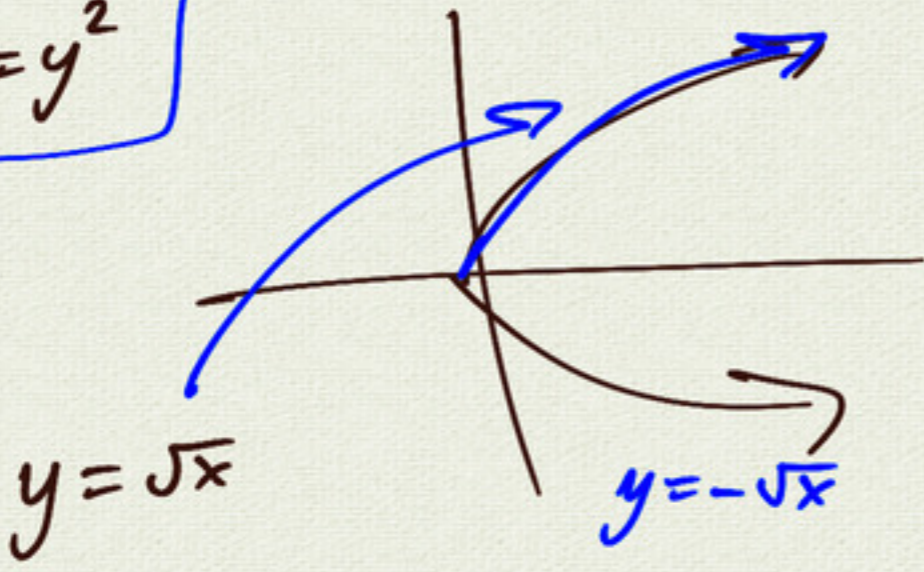


# 5.1 Parabolas



$$x = y^2$$



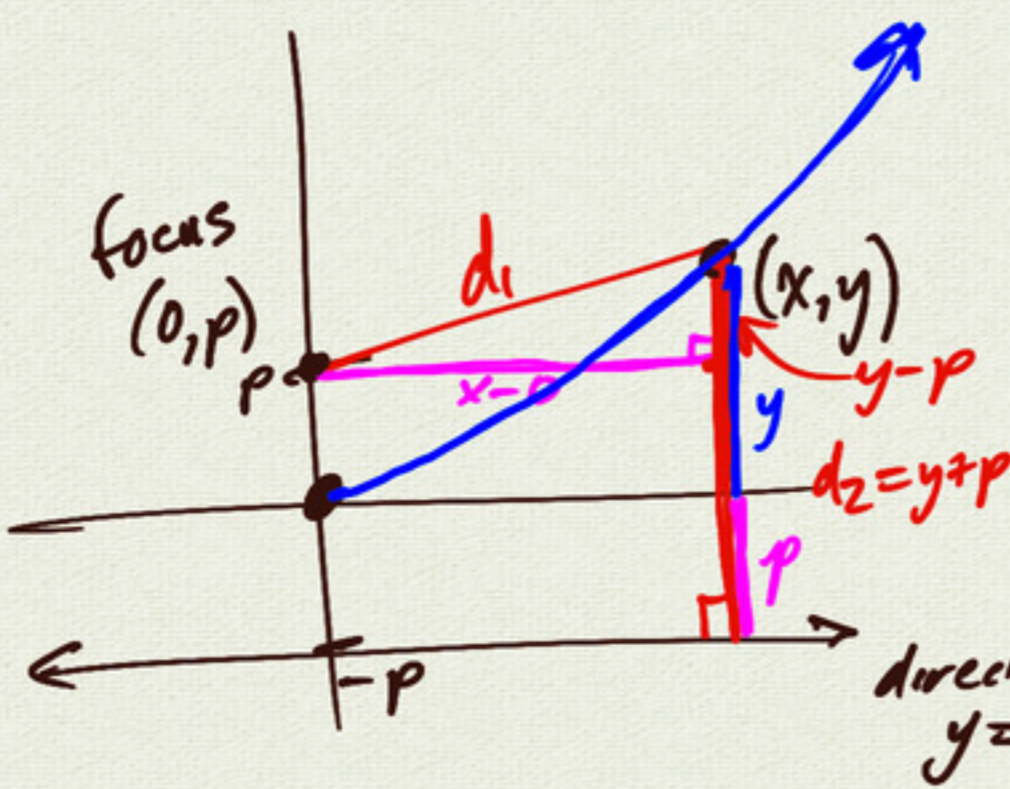
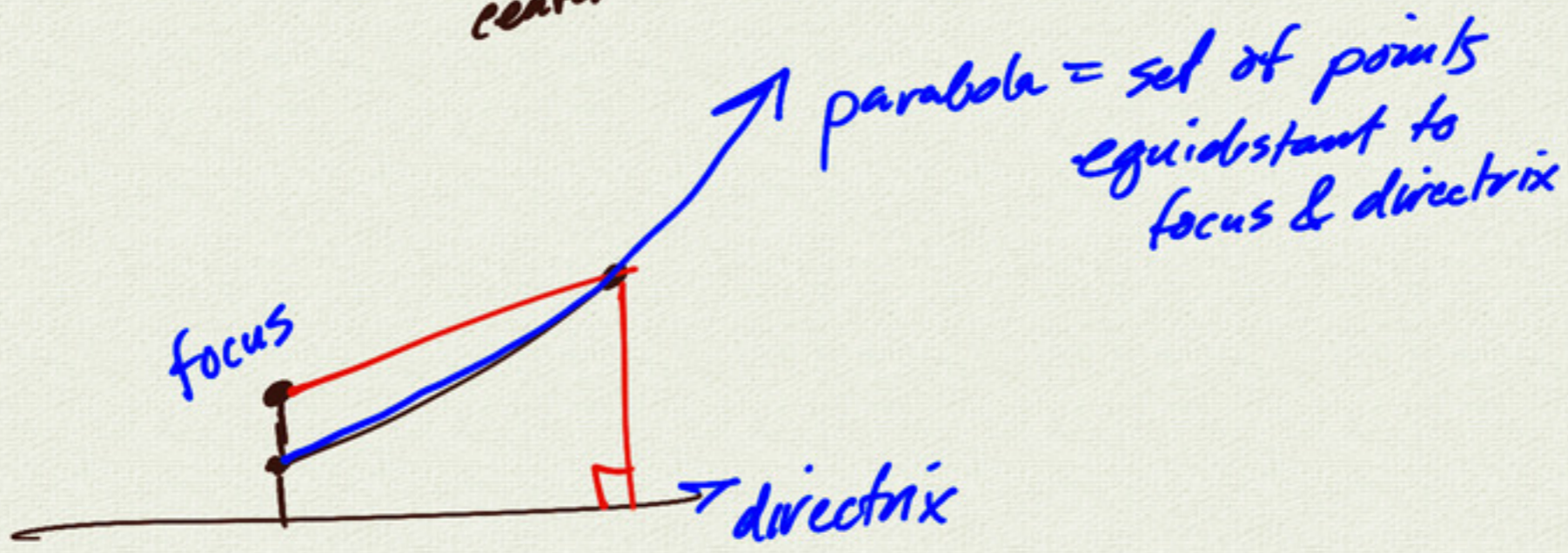
geometric definition  
of circle

algebraic

$$x^2 + y^2 = r^2$$



set of points  
equidistant  
from some  
center



distance to focus = distance to directrix

$$\sqrt{x^2 + (y-p)^2} = y+p$$

$$\begin{aligned} x^2 + (y-p)^2 &= (y+p)^2 \\ x^2 + (y^2 - 2py + p^2) &= y^2 + 2py + p^2 \\ x^2 - 2py &= 2py \\ x^2 &= 4py \\ y &= \frac{1}{4p}x^2 \end{aligned}$$

example:

focus  $(4\frac{1}{16}, 3)$   
directrix  $x = 4 - \frac{1}{16}$

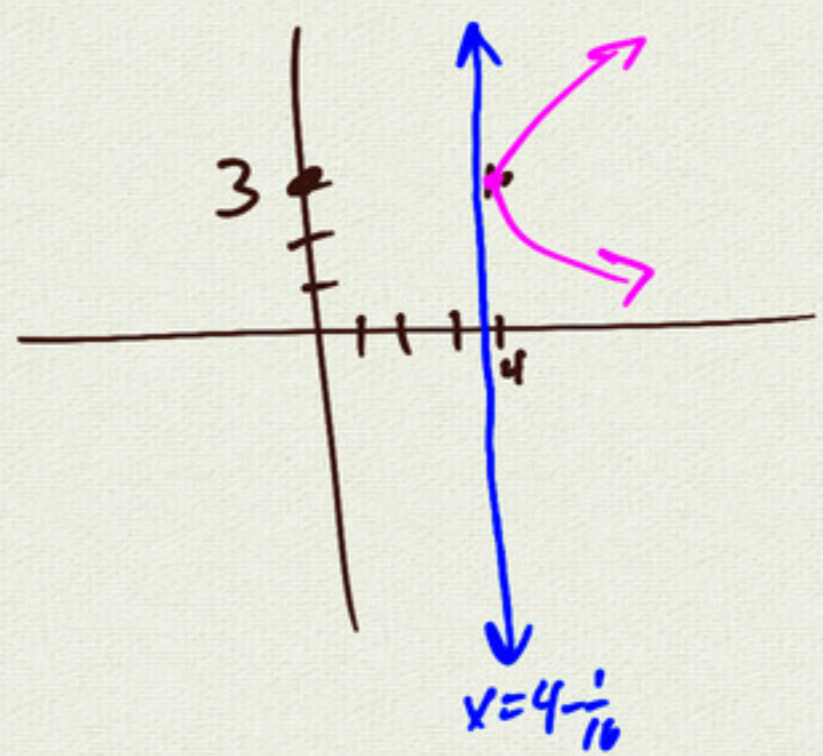
find equation of parabola  
vertex  $(4, 3)$

" $x = y^2$ "

$$x-h = \frac{1}{4p}(y-k)^2$$

$p = \frac{1}{16}$  distance from vertex to focus

$$x-4 = 4(y-3)^2$$



parabola

$$x-h = \frac{1}{4p}(y-k)^2$$

circle

$$(x-h)^2 + (y-k)^2 = r^2$$