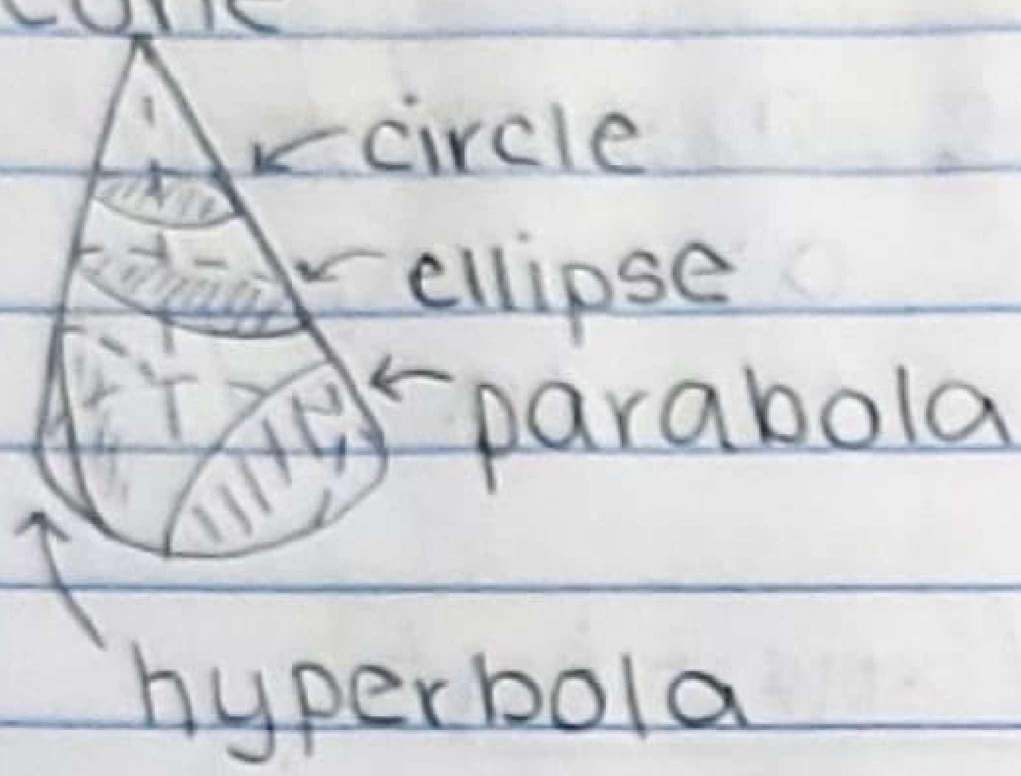
Conic Sections

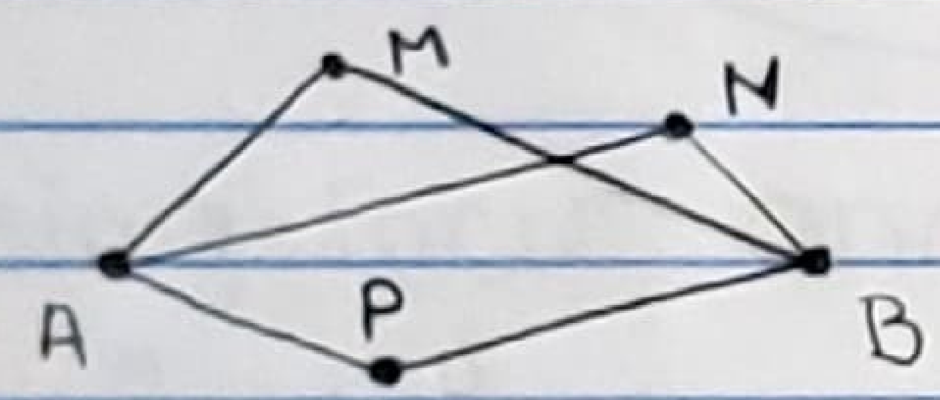
5/30/23

Cone



- ellipse
- parabola
- hyperbola

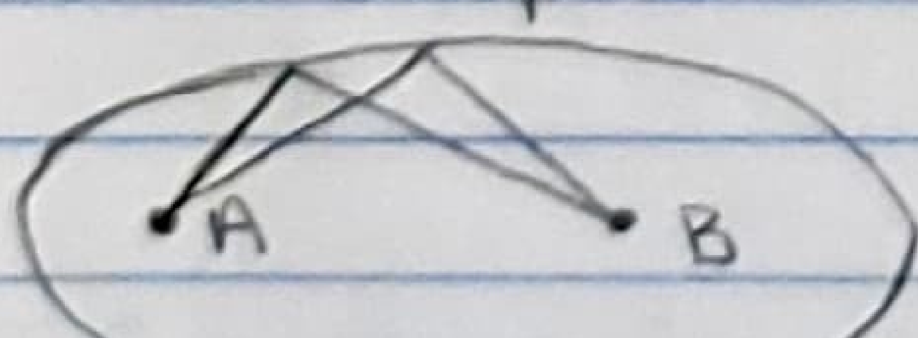
Conic sections can be described using
- distance to foci
- a focus and a directrix
- polar coordinates



Ellipse = set of points M such that
AM + BM = constant (d) ← length of the string

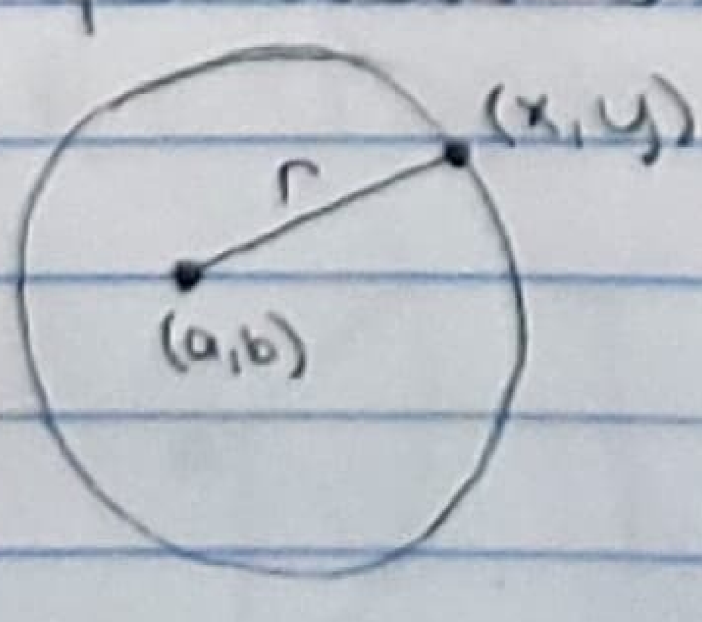
For A to be on the ellipse, AA + AB = d ⟺
AB = d

If d > AB then A and B don't belong to the ellipse

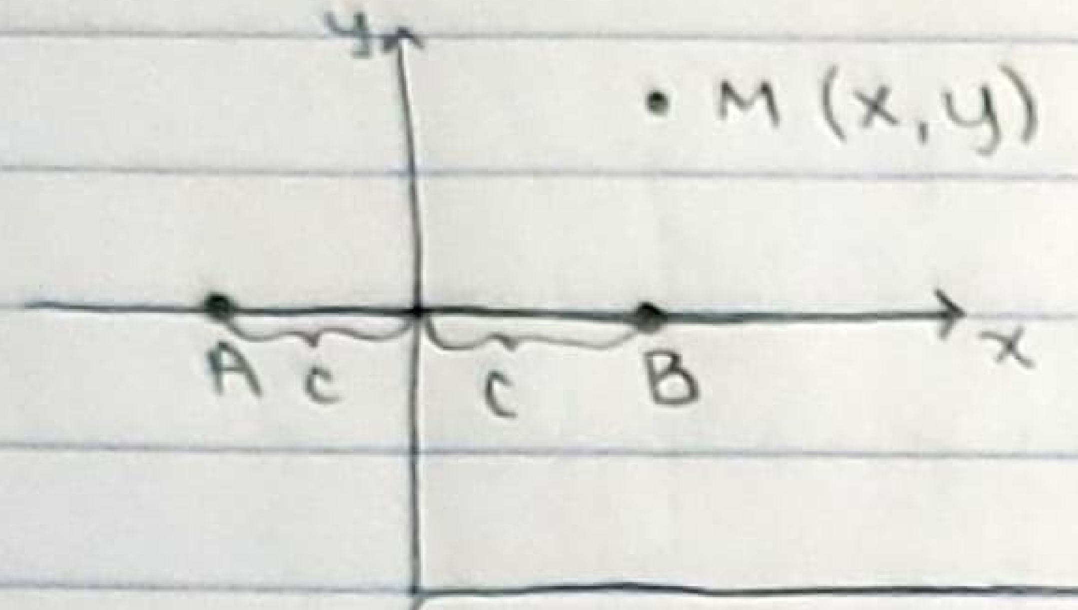


A, B called foci of the ellipse

Equation of Ellipse



$$\sqrt{(x-a)^2+(y-b)^2} = r$$
$$(x-a)^2 + (y-b)^2 = r^2$$



$A(-c, 0)$
$B(c, 0)$
$AM + BM = 2a$

$$AM = \sqrt{(x+c)^2 + (y-0)^2} = \sqrt{(x+c)^2 + y^2}$$
$$BM = \sqrt{(x-c)^2 + (y-0)^2} = \sqrt{(x-c)^2 + y^2}$$

For M to be on the ellipse, $AM + BM = 2a$

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

subtract
square both sides