MAT235: Welcome!

- Please read the Syllabus! (on Quercus).
- Recognized study Groups

Multivariable Calculus

I semester

Differential

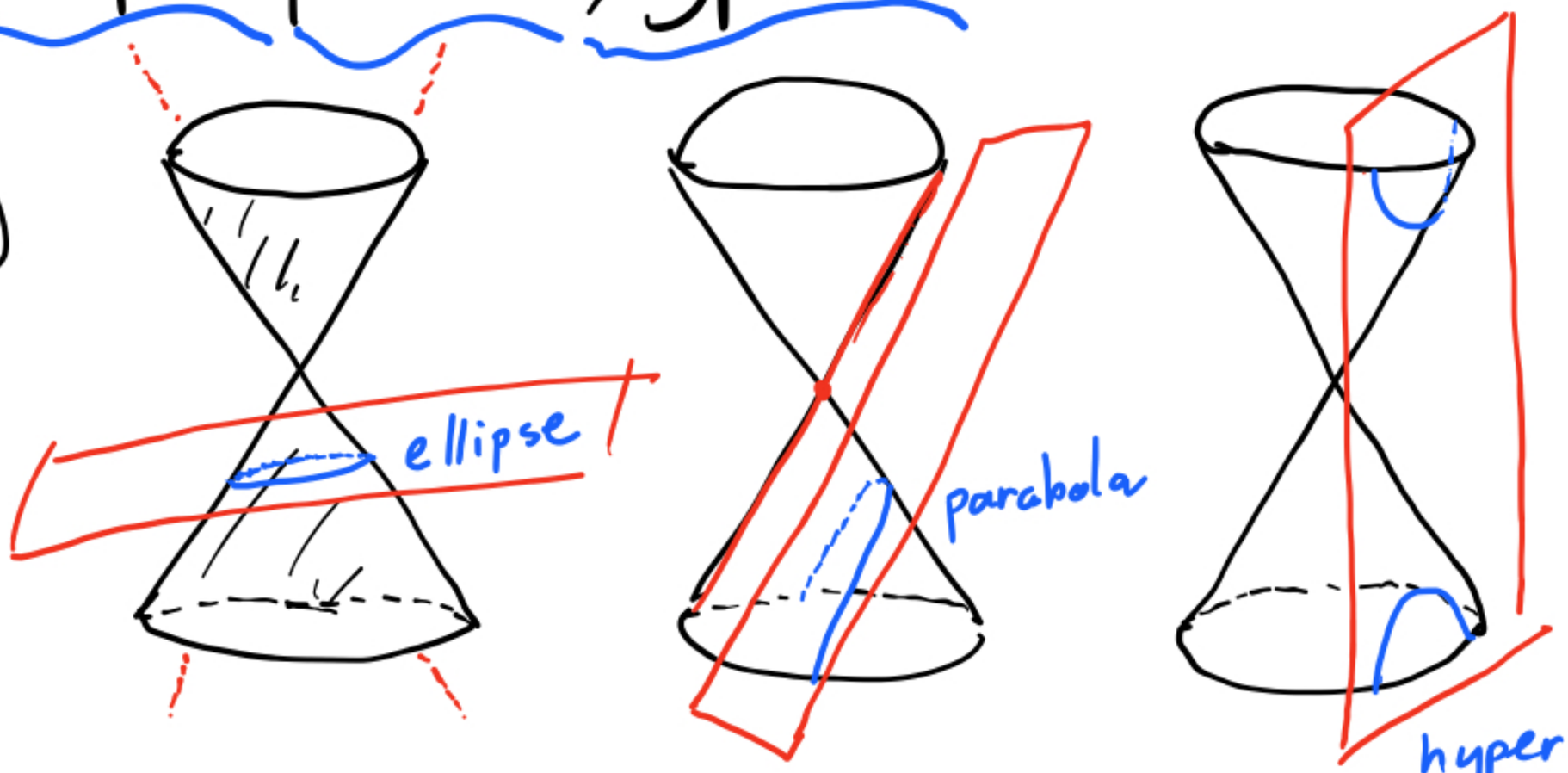
II semester

Integral

10.5. Conic Sections:

ellipse, parabola, hyperbola.

(double) Cone

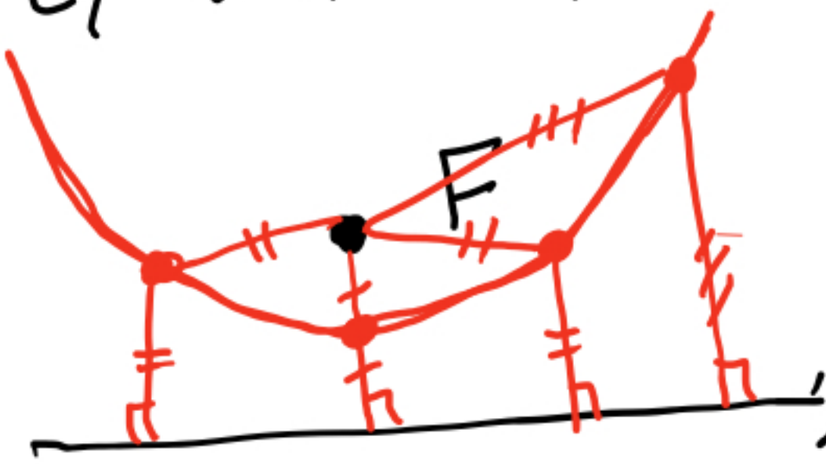


Conic sections - result of intersecting a (double) cone with a plane

- Ellipse, parabola and hyperbola are examples of conic sections.

Parabola

Def: a parabola is the set of all points in the plane equidistant from a point F (focus) and a line (directrix).

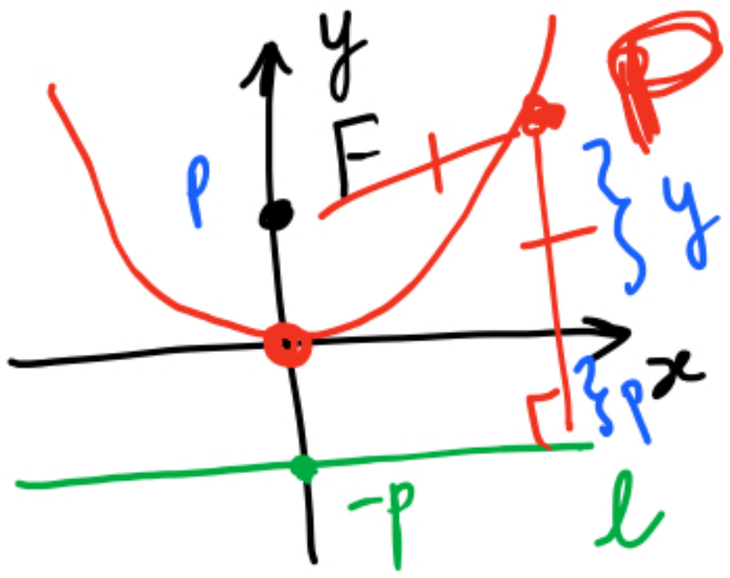


→ Equation

$p > 0$

Let $F = (0, p)$

and $y = -p$ be the directrix.



if $P = (x, y)$ is on parabola, then

then

$\rightarrow PF = \sqrt{x^2+(y-p)^2}$ (Recall) and distance to l is $y+p$.

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

Square both sides

$x^2 + y^2 - 2yp + p^2 = y^2 + p^2 + 2yp$

$\boxed{x^2 = 4yp}$

- equation of parabola with focus $(0,p)$ and directix $y=-p$.

Ellipse

Def: an ellipse is the set of all points in the plane with a constant sum of distances from points F_1 and F_2 (foci)