

## Derivation of Polar Equations for Conic Sections

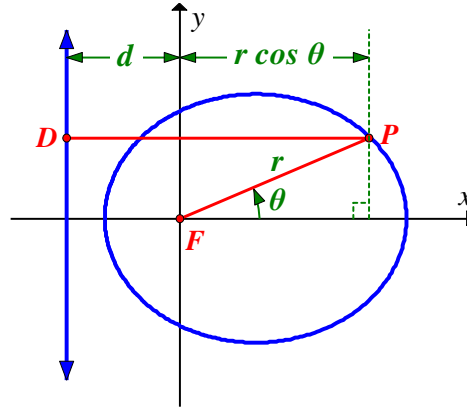
$$e = \frac{PF}{PD}$$

$$e = \frac{r}{d + r \cos \theta}$$

$$ed + er \cos \theta = r$$

$$r(1 - e \cos \theta) = ed$$

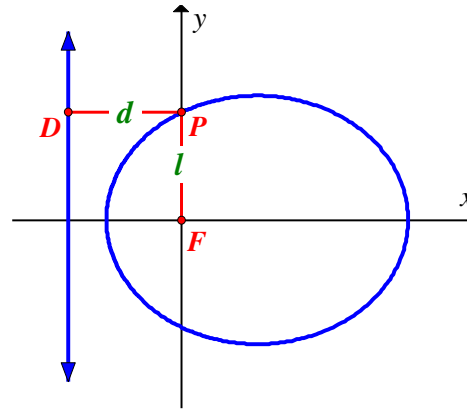
$$r = \frac{ed}{1 - e \cos \theta} \quad (*)$$



$$e = \frac{PF}{PD}$$

$$e = \frac{l}{d}$$

$$l = ed \quad (**)$$



Substituting the last equation (\*\*) into the polar equation (\*) gives the modified equation,

$$r = \frac{l}{1 - e \cos \theta}.$$