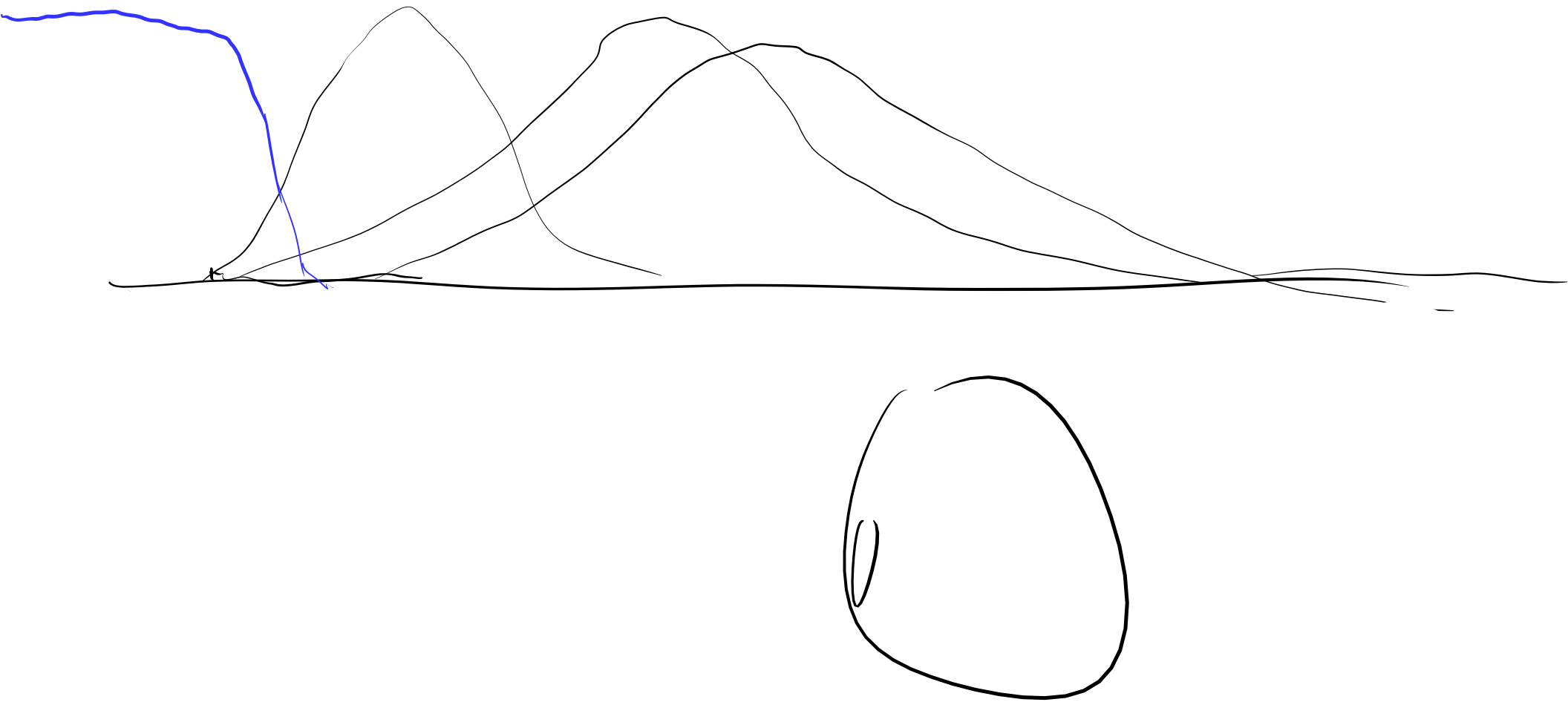
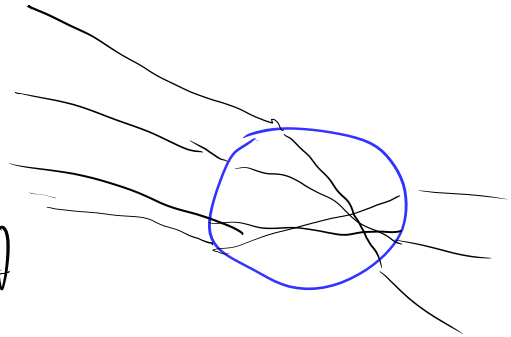
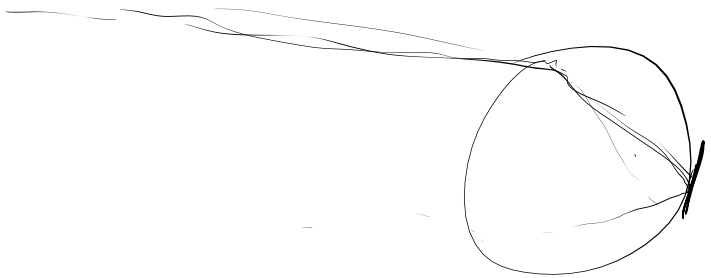
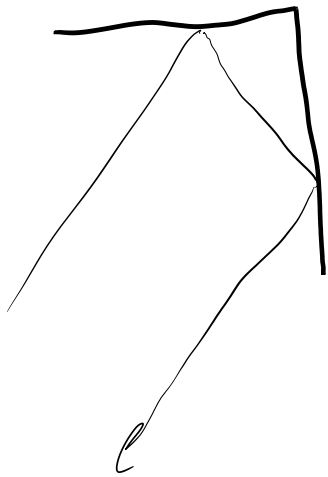
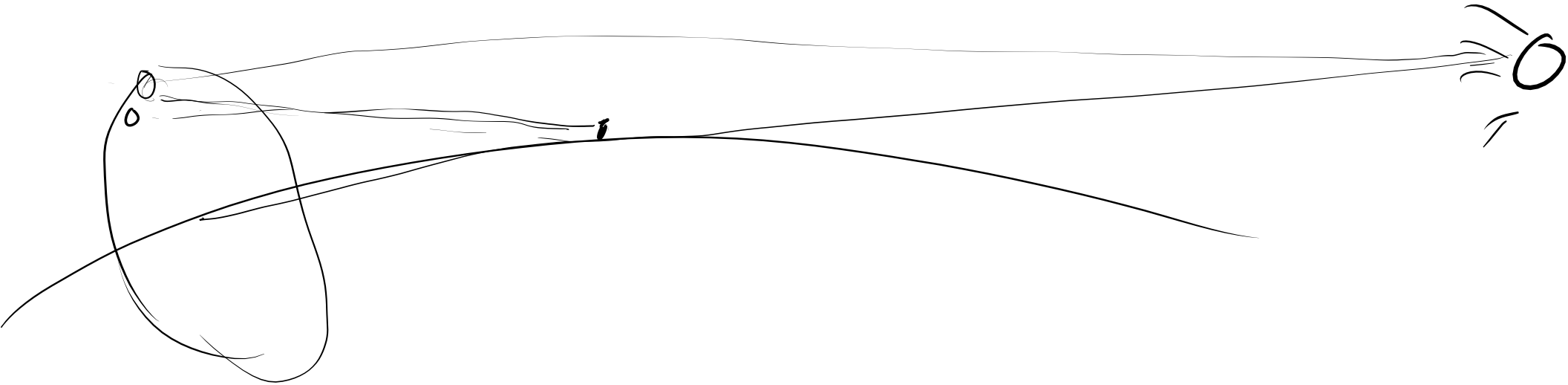
Beware the Crococat











$$\begin{bmatrix} C & S & 0 \\ -S & C & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

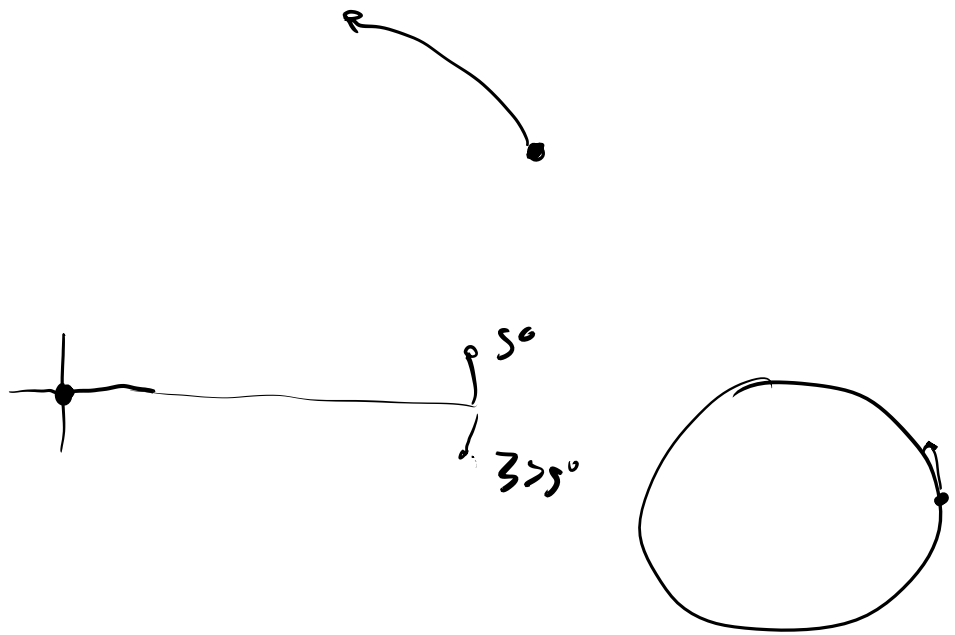
$C = \cos(\theta)$

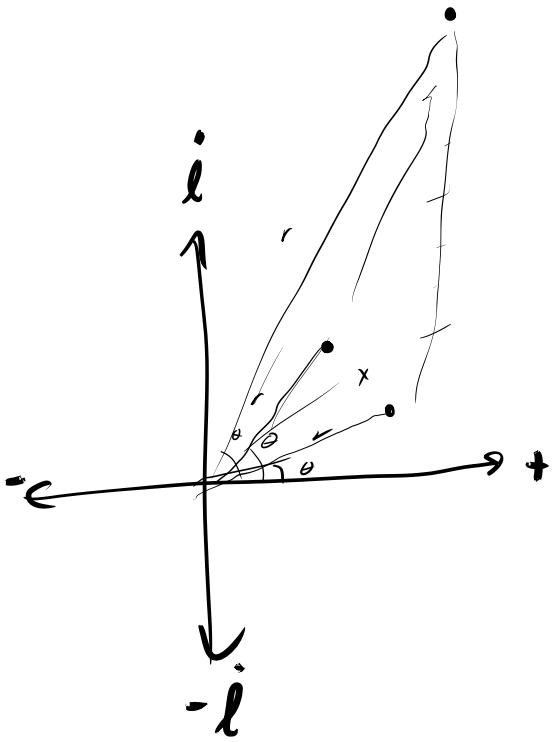
$S = \sin(\theta)$

angle

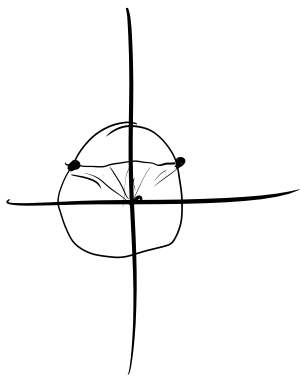
degrees

radians





$\sqrt{-1} \triangleq i$ $\qquad i^2 = -1$



$3 \cdot i = 3i = \sqrt{-9}$

$3 + i = 3 + i$

$(3+i)(2+2i) = \underbrace{6 + 2i^2}_{4} + 6i + 2i = 4 + 8i$ ($i^2 = -2$; $8i$)

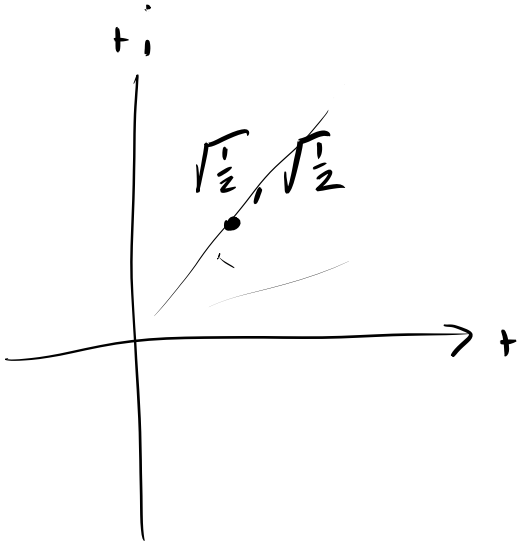
$C_1 \cdot C_2$ — mult len / add ang

$\left(\frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}}i\right)^8 = 1$

45°

$\frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}}i$

$\left(\frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}}i\right)^{1/7}$



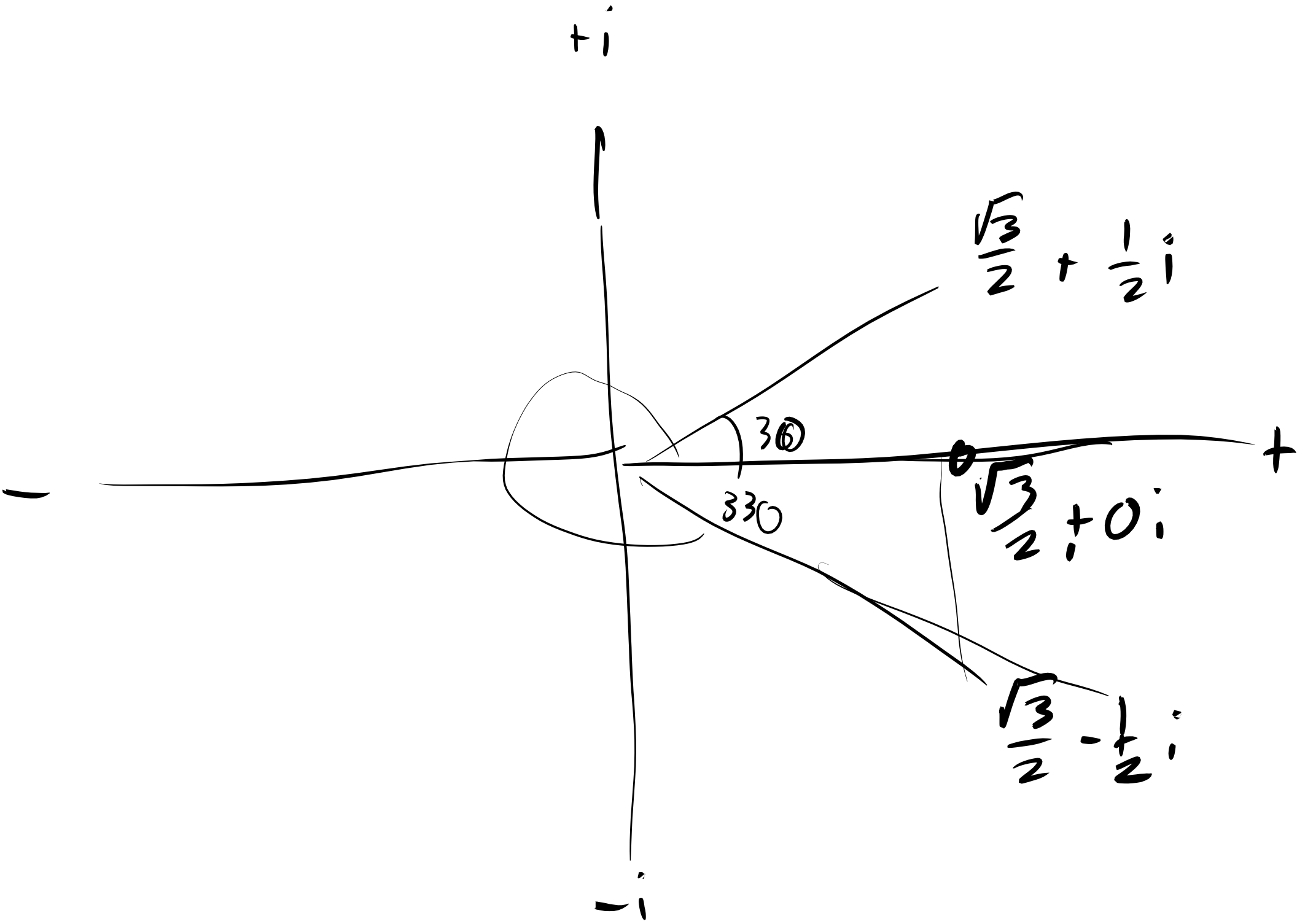
$a + ai$

$45^\circ \qquad 90^\circ$

$\left(\frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}}i\right)^2 = (\quad i)$

$\frac{1}{2} - \frac{1}{2}$ $\quad +\frac{1}{2}i + \frac{1}{2}i$

0 $\qquad$ 1


+i
−i
−
+
30
330
$\frac{\sqrt{3}}{2} + \frac{1}{2}i$
$\frac{\sqrt{3}}{2} + 0i$
$\frac{\sqrt{3}}{2} - \frac{1}{2}i$

3D orientation

$$\begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}$$

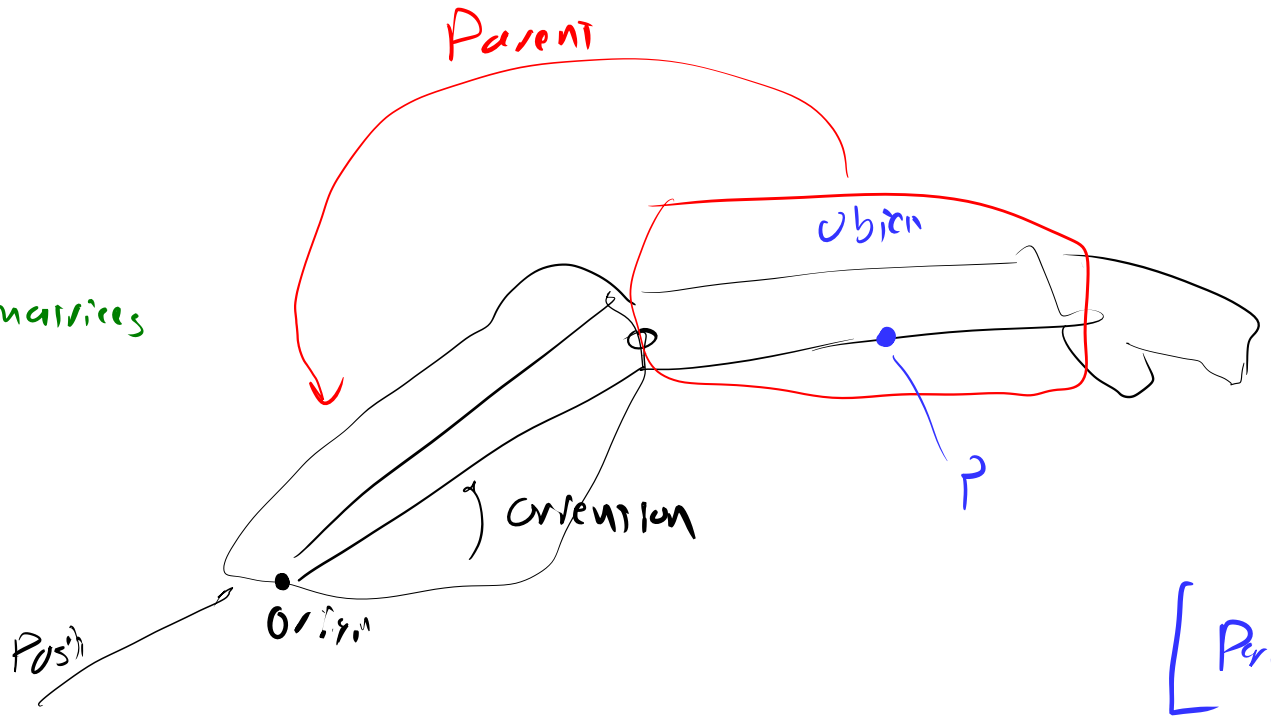
3D

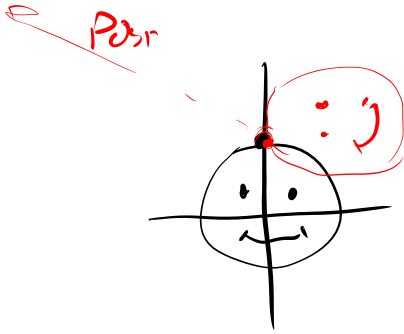
- 2D where pointing
- 1D Spin around

Quaternion

Object
- origin
- posin
- quatnion

hint: need 4 matrices





$$[\text{Par}]\left([\text{Obj}]\,p\right)$$

$$[\text{Obj}]_{2^{nd}}\,[\text{Par}]_{1^{st}}$$

$$[\text{origin}]_{\text{Trans}}\,[\text{Posn}]_{\text{Tran}}\,[\text{rotate}]_{\text{rot}}\,[\text{Tran to orig}]_{\text{Trans}}$$