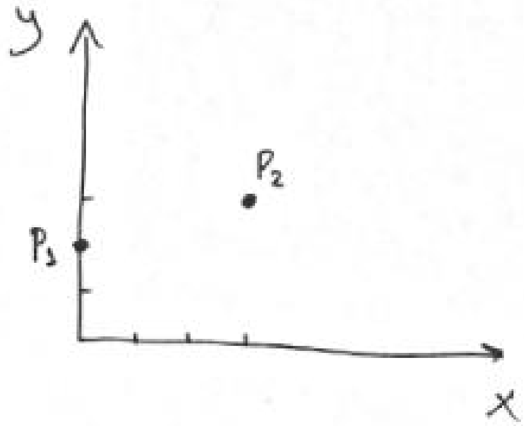
HW5 Ex2 Hough Lines

- $y = mx + b \Rightarrow b = -mx + y$

Ⓐ L1: $b = 2 \Rightarrow y = 2 \quad x = 0$

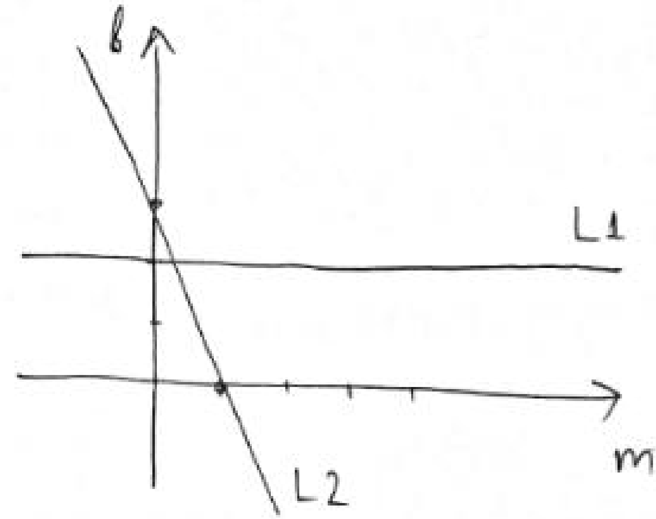
L2: $b = -3m + 3 \Rightarrow y = 3 \quad x = 3$



Ⓑ $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3-2}{3} = \frac{1}{3}$

$\Rightarrow \begin{cases} y = \frac{1}{3}x + b \\ 2 = \frac{1}{3} \cdot 0 + b \end{cases} \Rightarrow b = 2$

$\boxed{y = \frac{1}{3}x + 2}$



Ⓒ L3: $\begin{cases} y = \frac{1}{3}x + 2 \\ y = 0 \end{cases}$ → since L3 lies on $(m, b) = (0,0)$ point

$y = 0 \Rightarrow \frac{1}{3}x = -2 \Rightarrow x = -6 \Rightarrow \boxed{P3(-6, 0)}$

Ⓓ $x = yn + c, \quad (n, c) = (1/3, 0) \Rightarrow$

$\Rightarrow \begin{cases} x = \frac{1}{3}y + 0 \\ y = \frac{1}{3}x + 2 \end{cases} \Rightarrow y = \frac{1}{3} \cdot \frac{1}{3}y + 2 = \frac{1}{9}y + 2$

$\frac{8}{9}y = 2 \qquad y = \frac{18}{8}$

$x = \frac{1}{3} \cdot \frac{18}{8} = \frac{6}{10}$

$\boxed{\text{L4 intersects at } \left(\frac{6}{10}, \frac{18}{8}\right)}$

Q3]

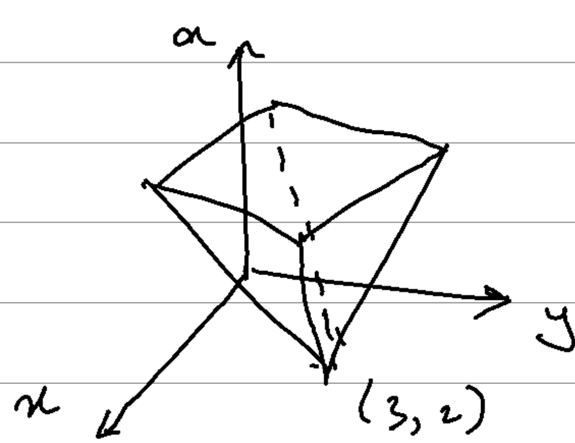
a) A square can be parameterized in several ways:

i) using coordinates of center and length of side (x_c, y_c, a)

ii) using coordinates of either corner and side

we can use polar coordinates (r, θ) instead of Cartesian coordinates.

b)



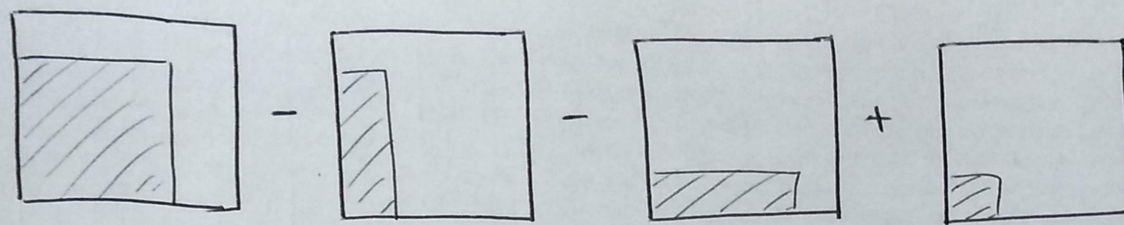
c) Two families of squares exists

i. with North East Corner at (3, 3)

ii. with South West Corner at (1, 2)

Q5)

a)



b)