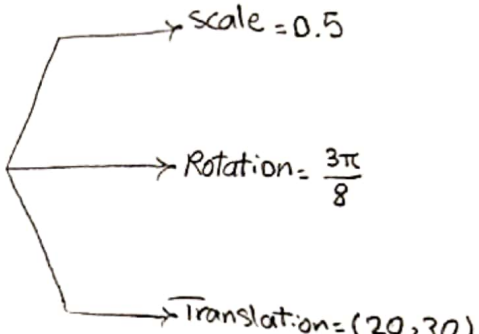
Lab 2

Q1)

a) $R = \begin{bmatrix} k\cos\theta & -k\sin\theta & t_x \\ k\sin\theta & k\cos\theta & t_y \\ 0 & 0 & 1 \end{bmatrix}$



$$= \begin{bmatrix} 0.5\cos\frac{3\pi}{8} & -0.5\sin\frac{3\pi}{8} & 20 \\ 0.5\sin\frac{3\pi}{8} & 0.5\cos\frac{3\pi}{8} & 30 \\ 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 0.19134172 & -0.46193977 & 20 \\ 0.46193977 & 0.19134172 & 30 \\ 0 & 0 & 1 \end{bmatrix}$$

Q3)

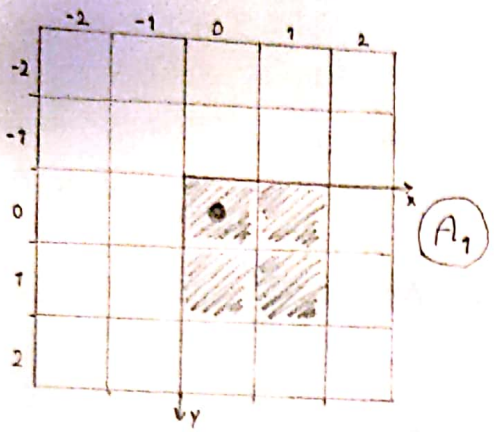
$$A = \begin{bmatrix} 1 & 1 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 1 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix} \qquad B = \begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 1 & 1 & 1 \\ 0 & 1 & 0 & 1 \end{bmatrix}$$

$$A \cup B \text{ (union)} = \begin{bmatrix} 1 & 1 & 1 & 0 \\ 0 & 1 & 1 & 0 \\ 1 & 1 & 1 & 1 \\ 0 & 1 & 0 & 1 \end{bmatrix} \qquad \check{B} \text{ (reflection)} = \begin{bmatrix} 1 & 0 & 1 & 0 \\ 1 & 1 & 1 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

$$A \cap B \text{ (intersection)} = \begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix} \qquad \neg A \text{ (complement)} = \begin{bmatrix} 0 & 0 & 0 & 1 \\ 1 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 \\ 1 & 1 & 1 & 1 \end{bmatrix}$$

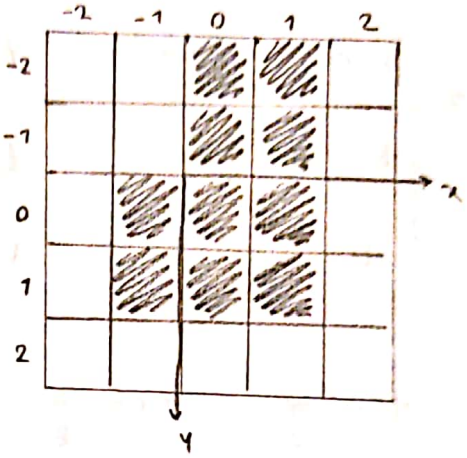
$$A \setminus B \text{ (set difference)} = \begin{bmatrix} 1 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

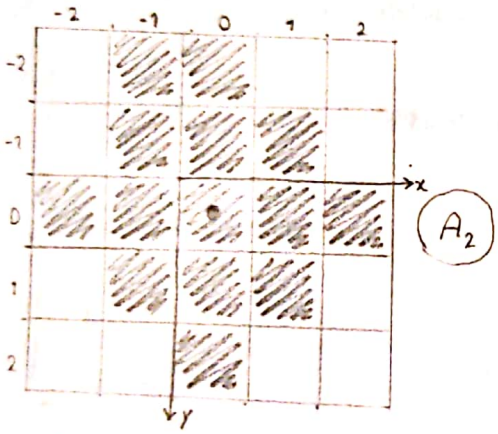
Q4)

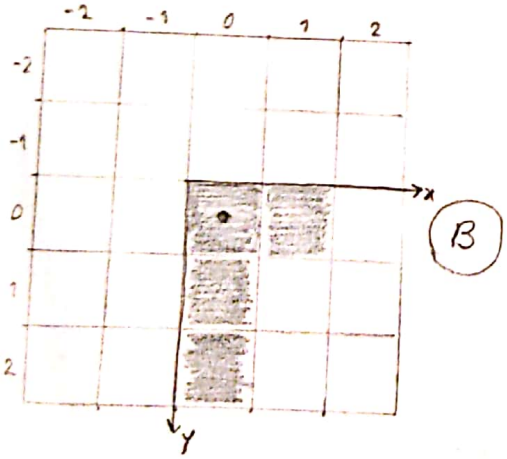


Dilation

$A_1 \oplus B$







Erosion

$A_2 \ominus B$