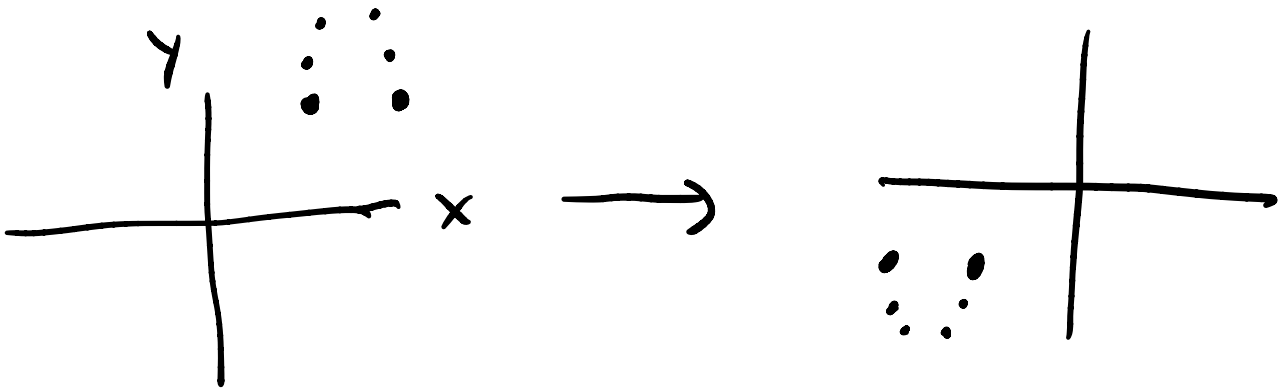
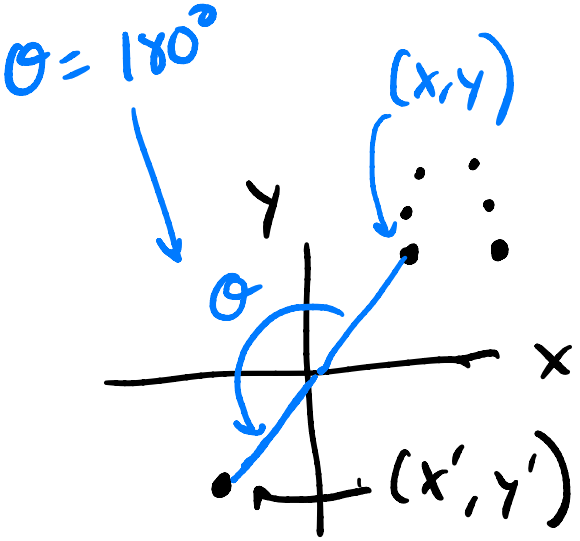
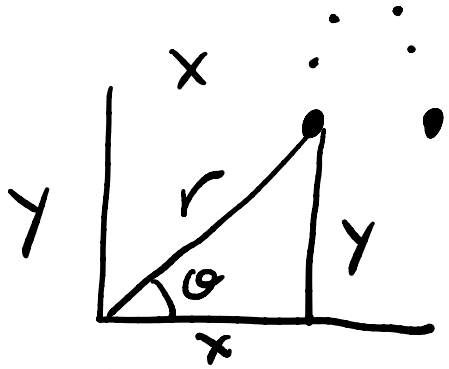
Lecture 9: 2D Rotation

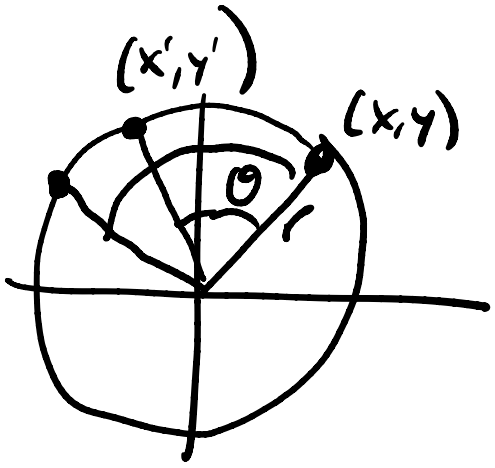






$$\cos\theta = \frac{x}{r}$$

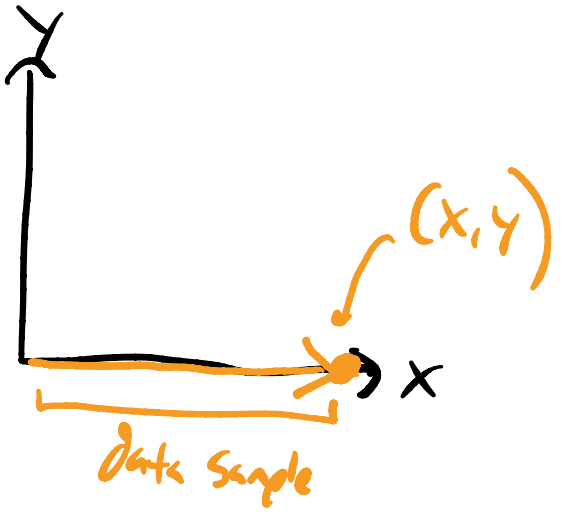
$$\sin\theta = \frac{y}{r}$$



$$\begin{bmatrix} x' \\ y' \\ 1 \end{bmatrix} = \begin{bmatrix} \cos\theta & -\sin\theta & 0 \\ \sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ 1 \end{bmatrix}$$

rotated data sample.

data sample



$\theta = 0°$:

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ 1 \end{bmatrix}$$

identity matrix

$x' = x$

$y' = y$

$1 = 1$

$\theta = 90°$:

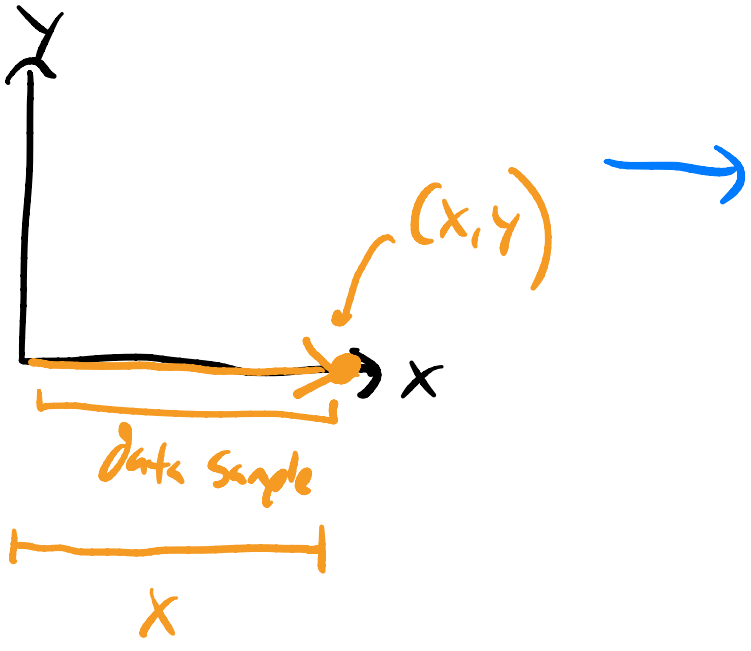
$$\begin{bmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ 1 \end{bmatrix}$$

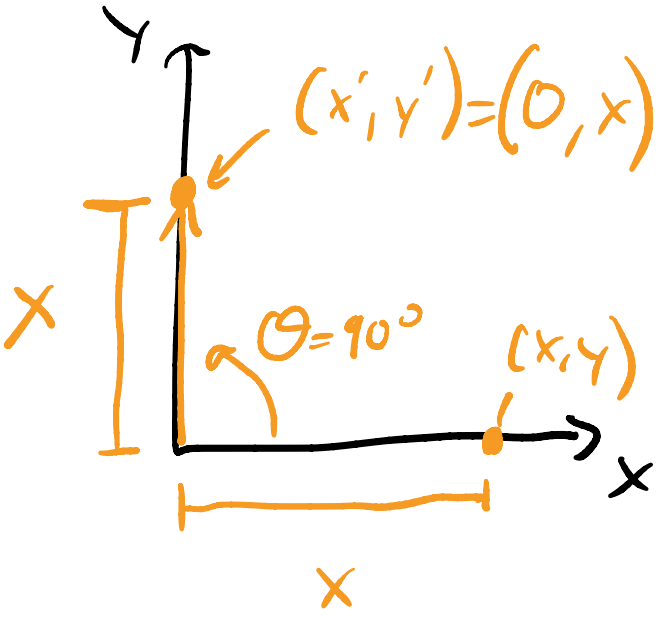
$y=0$

$x' = -y \Rightarrow x' = 0$

$y' = x$

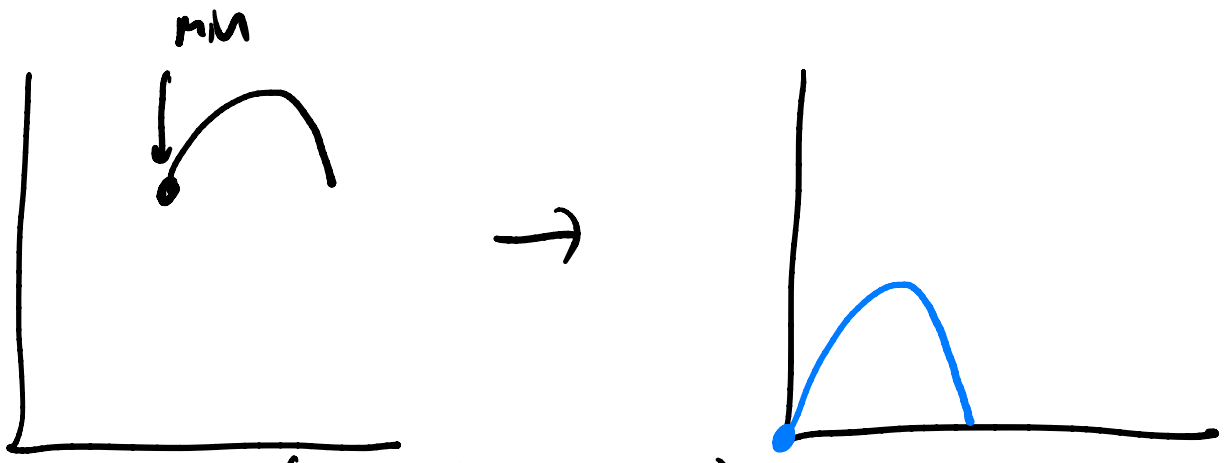
$1 = 1$





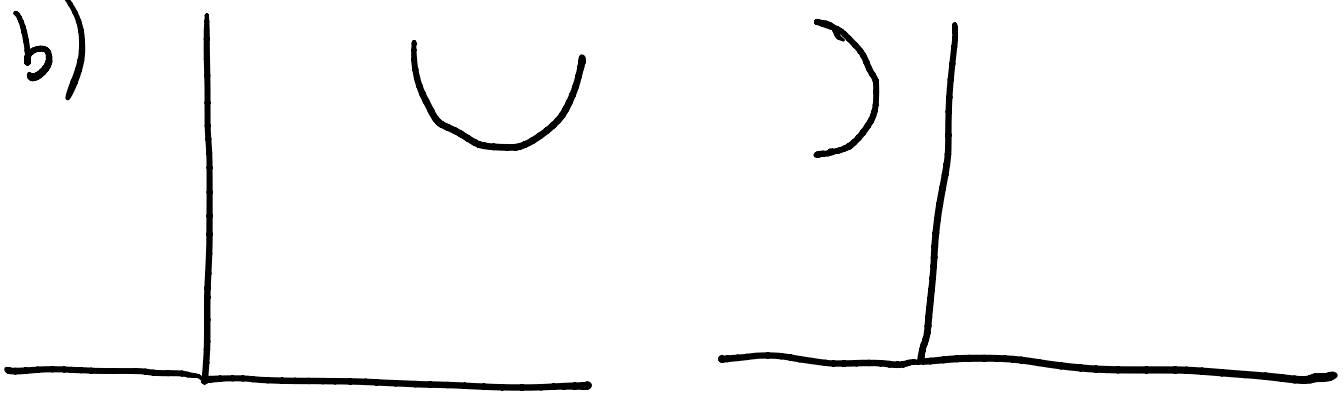
Worksheet

1a)



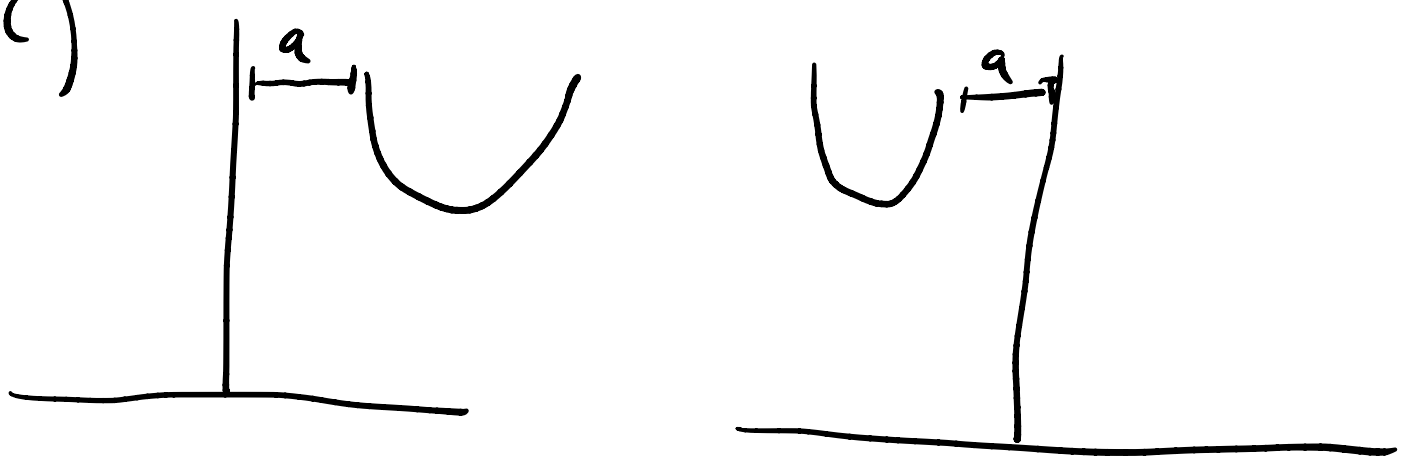
$A' = (T(-min) @ A.T).T$

1b)



$A' = (R(90°) @ A.T).T$

1c)



$$A' = (T(-2a, 0) @ A.T).T$$

$$A' = (S(-1, 0) @ A.T).T$$

Q2: