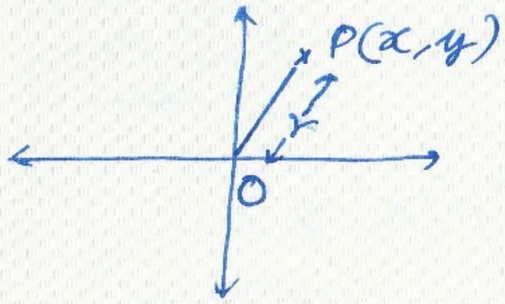
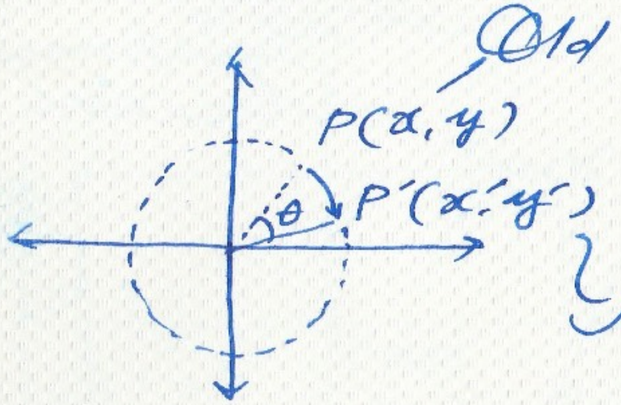
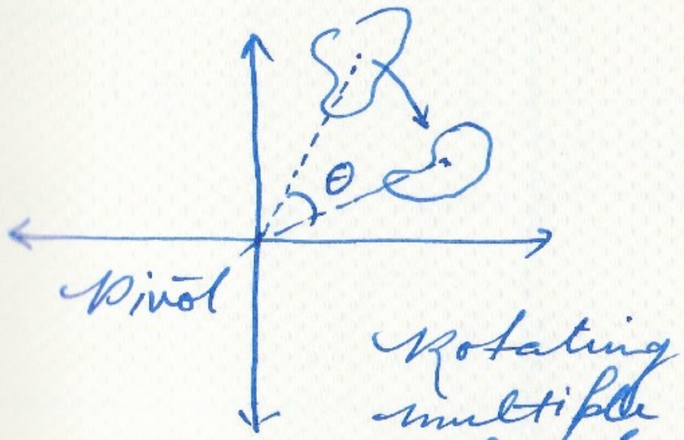
Rotation





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

$$x' = x\cos\theta - y\sin\theta$$
$$y' = x\sin\theta + y\cos\theta$$



Rotating multiple points.

Scaling

Affine spaces don’t have the concept of a single origin, in fact, it is a different kind of coordinate system in itself. Instead, they are associated to the bounds of the planes and its length or ratio. For this session, you can understand them as any transformations that retain parallelism.

In the first transformation, that is scaling, you will no longer retain the size of the object, but the form would remain intact.

This transformation can be calculated by just multiplying the scaling factor to each of the point in your object.

If your scaling factor is same for both x and y axes, then your scaling may be referred to as Isometric scaling.