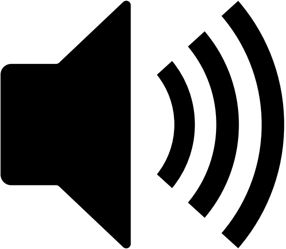
Shearing

In Shearing, each point in a geometry is translated in one direction but the magnitude of translation for each of the point is proportional to the amount of distance from a line that is parallel to that direction.

This is not an example of rigid transformation as the geometry is not preserved unlike other transformation we saw before.

For shearing, that will happen along x-axis, the non-parallel or lines adjacent to parallel lines to x-axis would be moved towards a new line with slope 1/m. m will be inverse of tangent of the angle theta of shearing.



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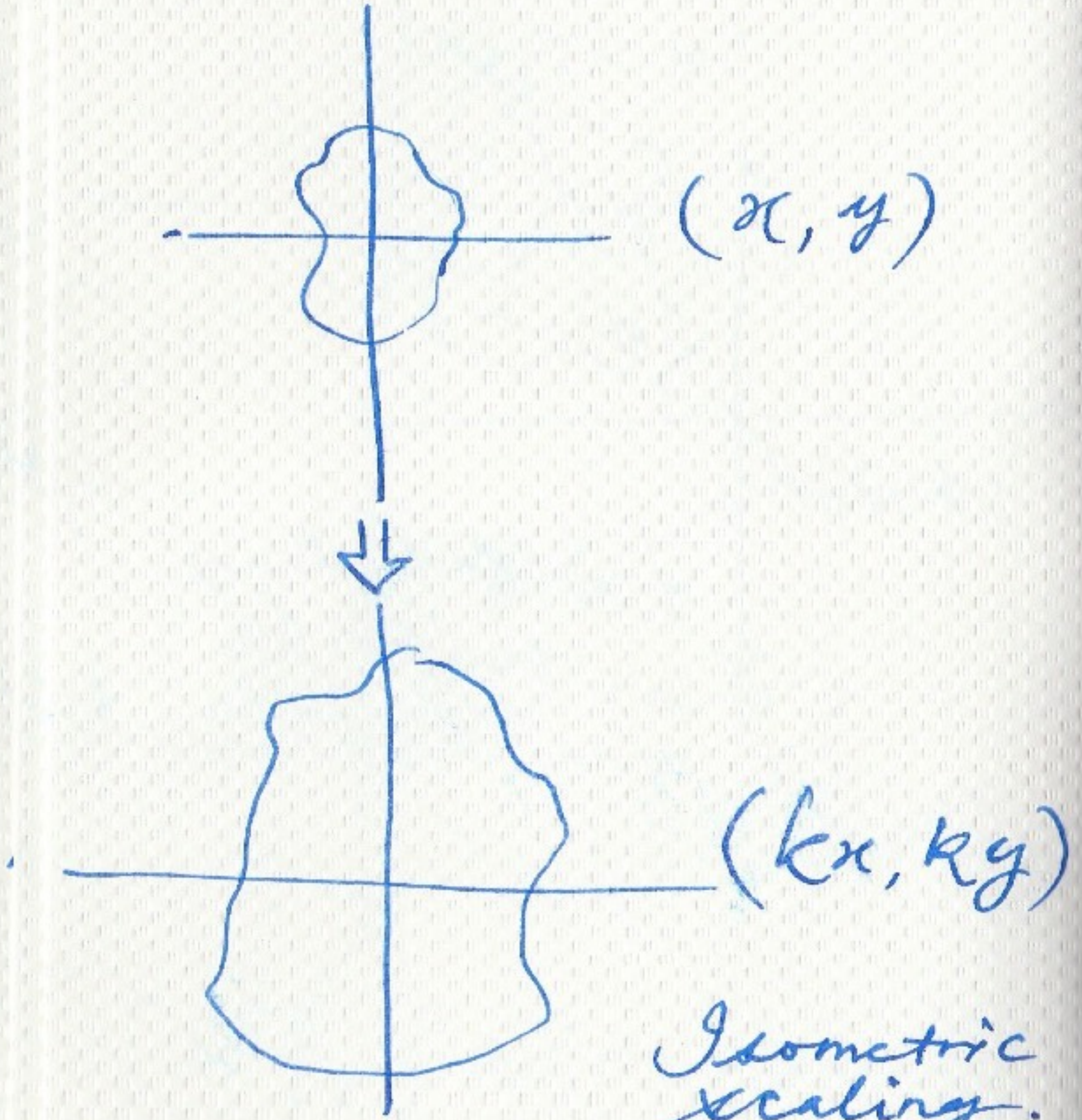
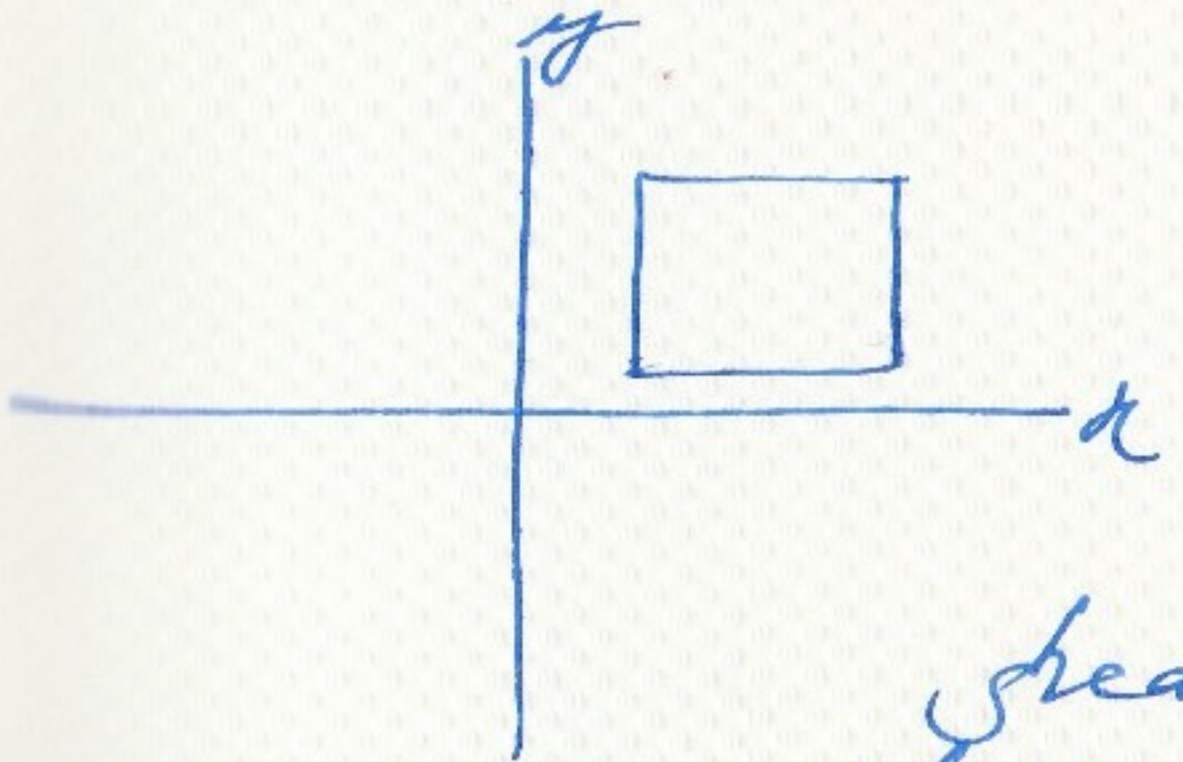
Scaling



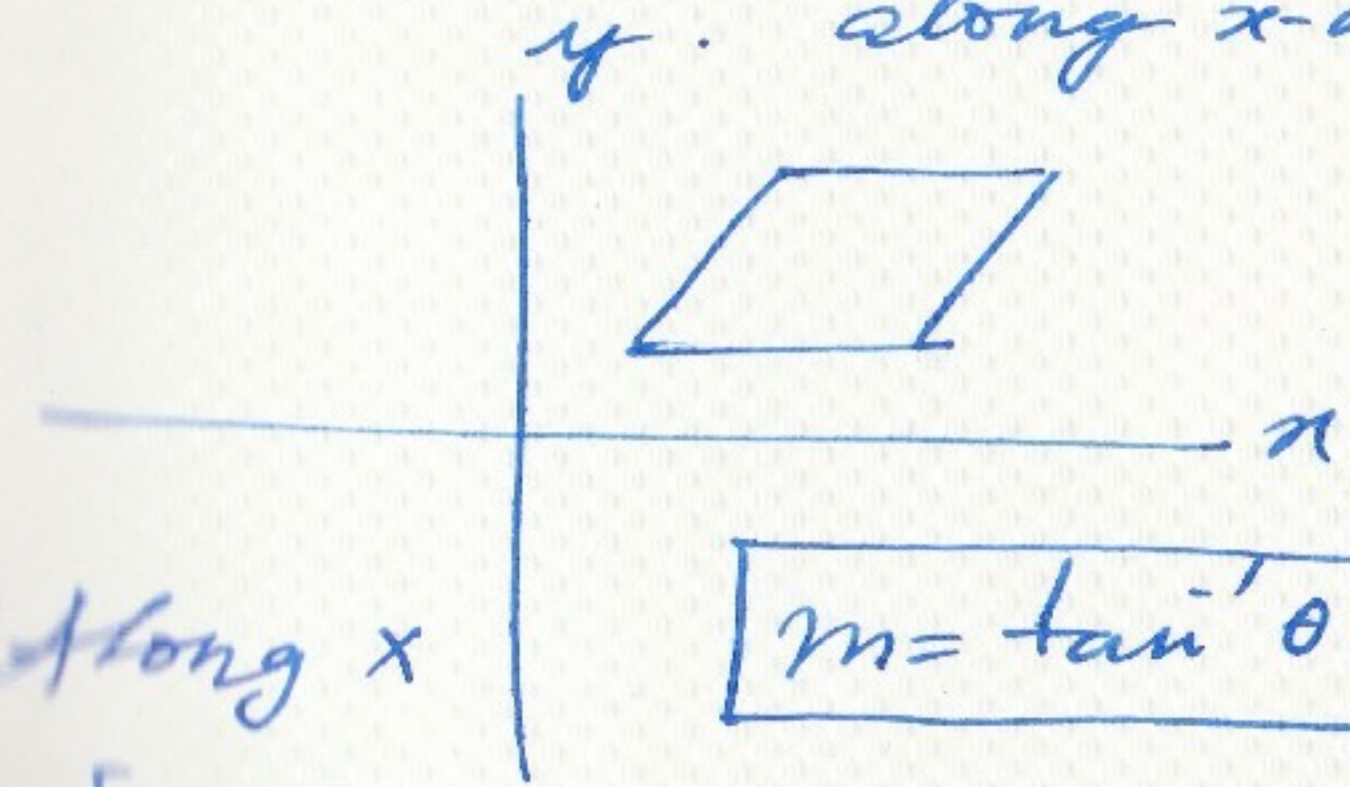
Isometric scaling.

$$\begin{bmatrix} x' \\ y' \end{bmatrix} = k \begin{bmatrix} x \\ y \end{bmatrix}$$

Shearing.



Shearing along x-axis is



$\boxed{m = \tan' \theta}$

Along x

$$\begin{bmatrix} x' \\ y' \end{bmatrix} = \begin{bmatrix} x + my \\ y \end{bmatrix} = \begin{bmatrix} 1 & m \\ 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix}$$

Along y

$$\begin{bmatrix} x' \\ y' \end{bmatrix} = \begin{bmatrix} x \\ mx + y \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ m & 1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix}$$