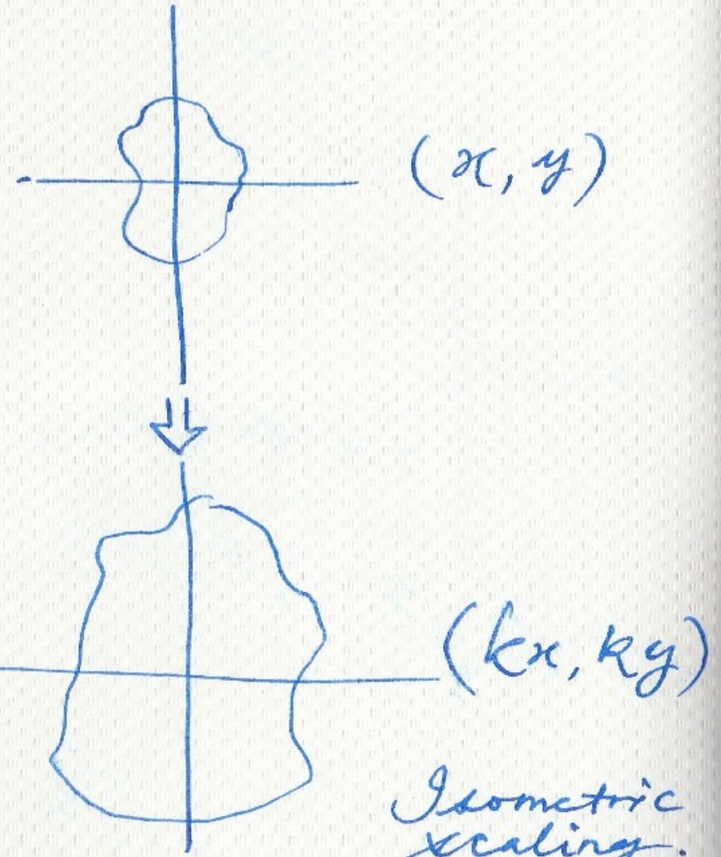
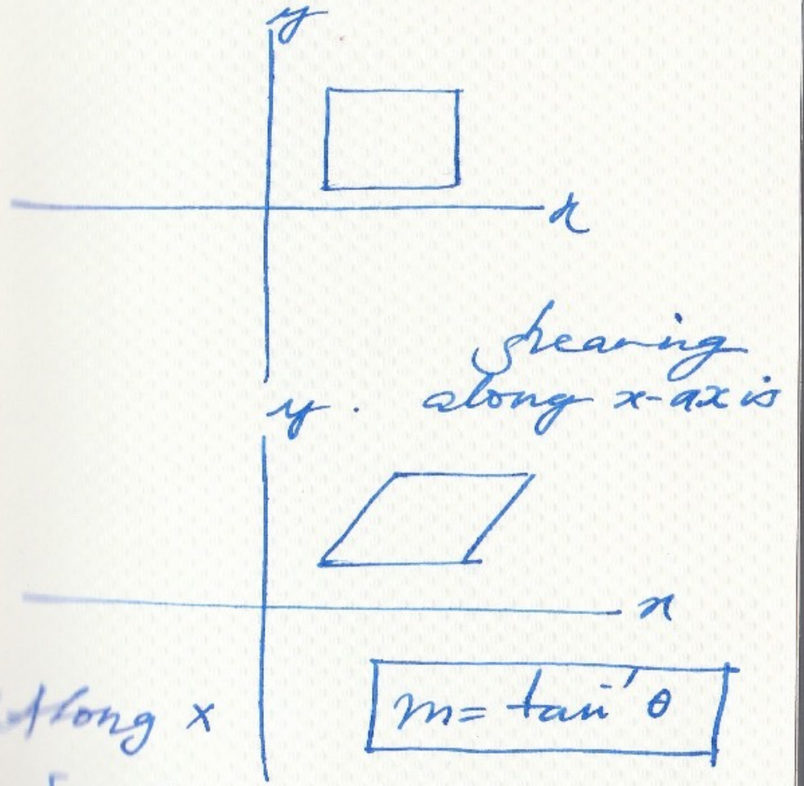
Scaling.



Isometric scaling.

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

Shearing.



along x

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

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

along y

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

Concluding note and the activity

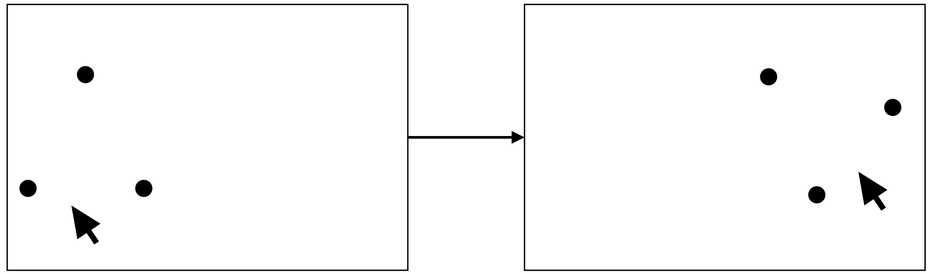
Pixelate students or P5.JS users may use loadPixels, pixels array and updatePixels functions to get information of pixel data and modifying them through your code. Link to Example: https://p5js.org/reference/#/p5/loadPixels

The goal of this activity to create a working demonstration through P5.JS for the given complex geometric transformations.

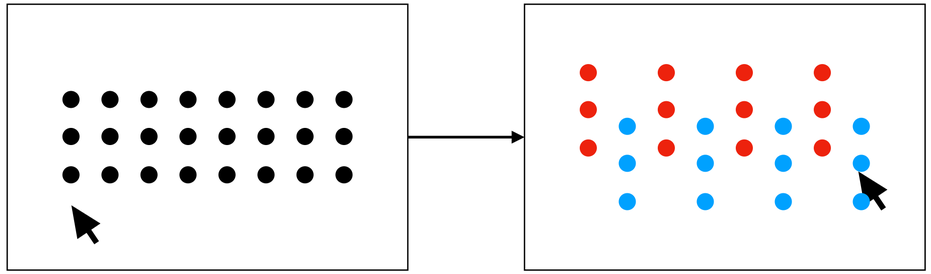
The first part is to get an image that you will use in the latter parts. I want you to take a close up picture of a section of your laptop screen so the pixels and subpixels are clearly visible. Use your mobile phone or camera as available, to do this. Once you have the picture, crop this into the aspect ratio of 4:3.

The second part is to create a P5.JS sketch of 4:3 aspect ratio. I think 400 x 300px will be ideal to have. Place the image from the first part on this canvas so that it covers the whole area. Access color values of all pixels and show it up on your console.

In the third part, pick one or more given choices and implement them in your P5.JS sketch. Once you are done, screen record your sketch output to share with us, that it's done.



Choice 1: A portion of the image pixels rotate and translate (towards the other side of edge) as mouse cursor goes from one edge to another



Choice 2: Pixels from entire image moves towards either top or bottom edge in alternate columns (as shown). The amount of translation becomes function of mouse coordinate on x-axis.