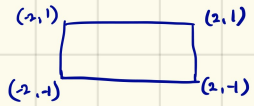
*. objects : 

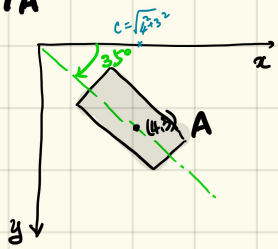
bar : array of the four vertices

star : array of the five vertices.

$\begin{cases} T(a,b): \text{translation by } \begin{pmatrix} a \\ b \end{pmatrix}. \\ R(\omega): \text{rotation by } \omega. \end{cases}$

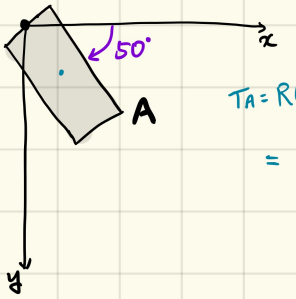
Find T_A

1. (10)



$T_A = T(4,3)R(35)$

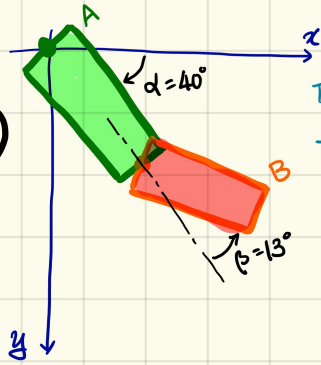
2. (10)



$T_A = R(50°)T(1,0)$

=

3. (10)



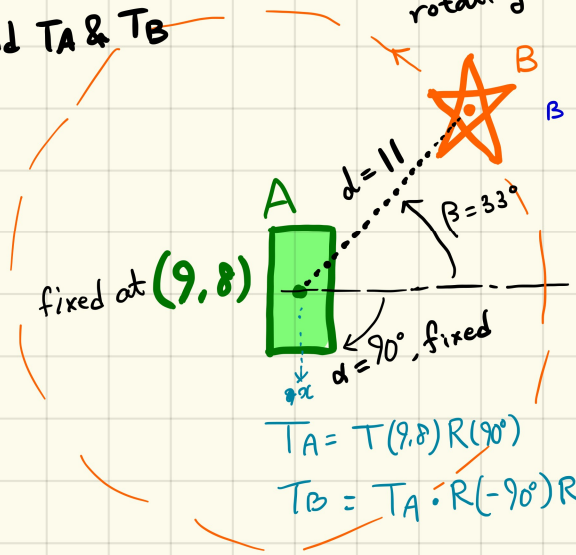
Find T_A & T_B

$T_A = R(40°)T(1,0)$

$T_B = T_A \cdot T(1,0)R(13°)T(1,0)$

Keyboard : a, b to controll α, β

4. Find T_A & T_B (10)

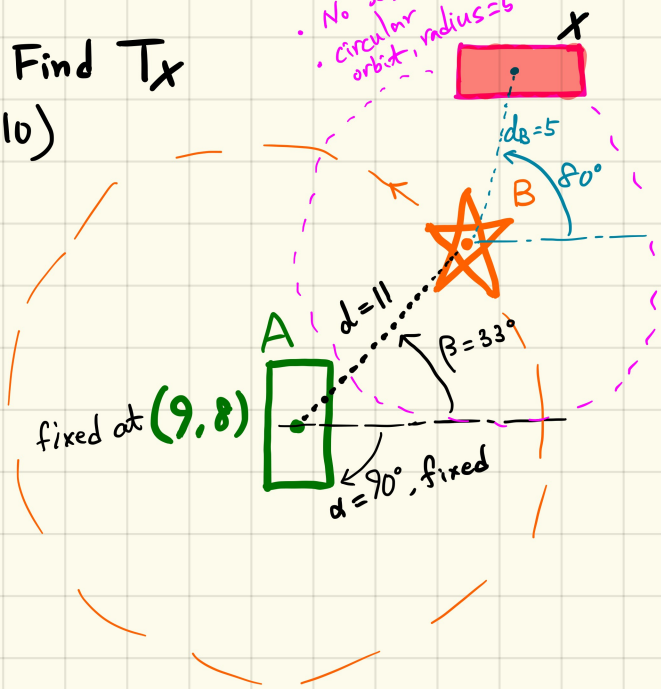


$T_A = T(9,8)R(90°)$

$T_B = T_A \cdot R(-90°)R(\beta)T(d,0)R(-\beta)$

5. Find T_X (10)

$T_X = T_B \cdot R(-80°)T(5,0)R(80°)$



6. Calculate. (10)

$$A = \begin{bmatrix} \cos(\alpha) & -\sin(\alpha) & 0 \\ \sin(\alpha) & \cos(\alpha) & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 & x \\ 0 & 1 & y \\ 0 & 0 & 1 \end{bmatrix}$$

7. Calculate (10)

$$A = \begin{bmatrix} 1 & 0 & x \\ 0 & 1 & y \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} \cos(\alpha) & -\sin(\alpha) & 0 \\ \sin(\alpha) & \cos(\alpha) & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

8. Calculate transformed coordinates Y by the homography matrix H (10)

$$H = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0.01 & 1 \end{pmatrix}$$

$\alpha = 400$

$$X = \begin{bmatrix} 0 & \alpha & \alpha & 0 \\ 0 & 0 & \alpha & \alpha \end{bmatrix}$$: 4 corner points.

9. Choose any image (RGB) and apply (10)

① Gaussin filter of 25 x 25 size kernel.

② Median filter of 7x7 size kernel.

Show the source image and two filtered images.

10. Make a Fractalius image. (10)

* You must use 8 filters only (not 16):
  Build only 8 filters.
* Apply the operation & show the result.

* Your solution must be in one jupyter notebook.
* Submit it only.

* #1 ~ #5 : Make a pygame program to present animations.

• the link below may help you.

https://studywolf.wordpress.com/2015/03/06/arm-visualization-with-pygame/