

1. Perform  $45^\circ$  rotation of a triangle  $A(0, 0)$ ,  $B(1, 1)$ , and  $C(5, 2)$  (a) about the origin and (b) about  $P(-1, -1)$ .
2. Magnify a triangle with vertices  $A(0, 0)$ ,  $B(1, 1)$ , and  $C(5, 2)$  to twice its size while keeping  $C(5, 2)$  fixed.
3. Find the form of the matrix for reflection about a line  $L$  with slope  $m$  and  $y$  intercept  $(0, b)$ .
4. Show that the order in which the transformations are performed is important by the transformation of the triangle  $A(1, 0)$ ,  $B(0, 1)$ , and  $C(1, 1)$ , by (a) rotating  $45^\circ$  about the origin and then translating the the direction of vector  $\mathbf{I}$  and (b) translating and then rotating.
5. Prove that  $2D$  rotation and scaling commute if  $s_x = s_y$  or if  $\theta = n\pi$  for integral  $n$ , and that otherwise not.

B. Buat program melakukan iterasi scaling  $S_x=2$ ,  $S_y=2$  (2x perbesaran) terhadap 3 buah lingkaran, dengan diameter yang sama (d) dan titik pusat masing-masing:

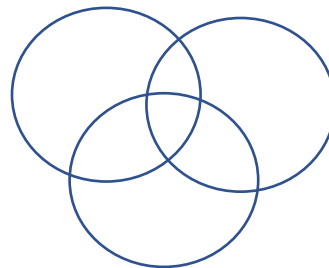
$$C_1(x_1, y_1)$$

$$C_2(x_2, y_2)$$

$$C_3(x_3, y_3)$$

Dengan jumlah maksimum iterasi masing-masing lingkaran adalah  $n$  kali ( $1 \leq n < 100000$ ),

Iterasi akan berhenti pada masing-masing lingkaran apabila beririsan dengan 2 lingkaran lainnya.



Hitung berapa jumlah iterasi yang terjadi pada masing-masing lingkaran  $C_1$ ,  $C_2$  dan  $C_3$ .

Deadline: 31 Maret 2021, pukul 16.00 WIB