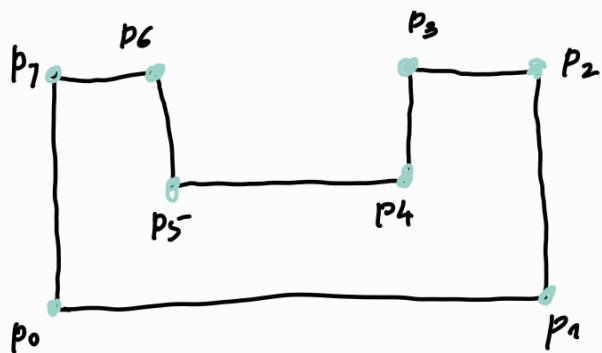


## Logic of creating a 2D polygon with rounded corners

There are 9 conditions and 4 input functions required.

Consider the section below



radius list for 7 points  
P0 P1 P2 P3 P4 P5 P6 P7  
radius → 0 0 1 1 5 5 1 1

- So, at each point a radius could be specified or no radius specified.
- Point could be clockwise or counter clockwise.  
clockwise is denoted by '1' and ccw as '-1'

- For each point consider the point just before it.

- let's say

$p_a$  = previous point

$p_b$  = The point in consideration.

$r_a$  = radius at previous point

$r_b$  = radius at the point in consideration.

- Conditions are

$p_a \ p_b \ r_a \ r_b$

Condition 1 - - 0 0

if at both the points  $p_a$  and  $p_b$ , there is no radius specified, it does not matter how the points are oriented.

$$p_a \quad p_b \quad r_a \quad r_b$$

$$\text{Condition 2} \quad -1 \quad - \quad >0 \quad 0$$

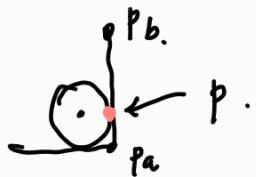
where ever the radius is not specified, orientation of that point is not necessary

The above condition can be denoted by.



The circle at the point  $p_a$  shows that a radius is specified at  $p_a$  and the joining horizontal to vertical lines shows that the orientation of  $p_a$  is ccw(-1)

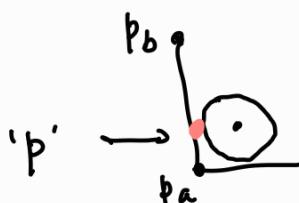
In this a point 'p' as shown below needs to be calculated.



function circle to point tangent  
to be created to find point 'p'

error can be raised if the tangent point on the circle, made by line  $p_a \rightarrow p_b$  goes beyond point 'p\_b'

$$\text{Condition 3} \quad 1 \quad - \quad >0 \quad 0$$

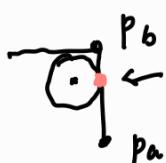


function point to circle tangent  
to be created to find point 'p'

error can be raised if tangent point on the circle drawn by line  $p_a \rightarrow p_b$  goes beyond 'p\_b'.

$$p_a \quad p_b \quad r_a \quad r_b$$

$$\text{Condition 4} \quad - \quad -1 \quad 0 \quad >0$$

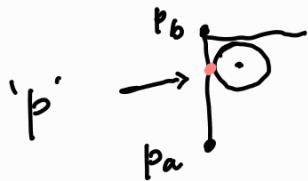


function point to circle tangent

error can be raised if tangent on the circle drawn by line  $p_a \rightarrow p_b$  goes beyond 'p\_a'

Condition 5

$$\begin{array}{cccc} p_a & p_b & r_a & r_b \\ - & 1 & 0 & >0 \end{array}$$

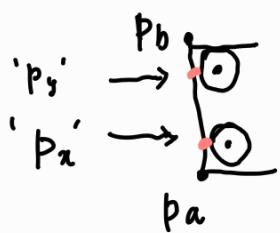


function circle to point tangent

error can be raised if tangent on the circle drawn by line  $p_a \rightarrow p_b$  goes beyond 'pa'

Condition 6

$$\begin{array}{cccc} p_a & p_b & r_a & r_b \\ 1 & 1 & >0 & >0 \end{array}$$

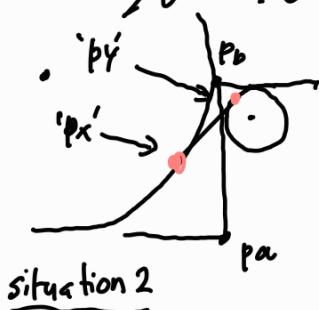
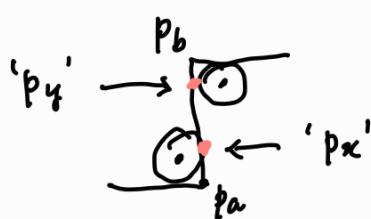


function 2 circle tangent point  
to be created to calculate points.  
'p\_x' and 'p\_y'

In this case error to be raised if the tangent points 'p\_x' and 'p\_y' cross over

Condition 7

$$\begin{array}{cccc} p_a & p_b & r_a & r_b \\ -1 & 1 & >0 & >0 \end{array}$$



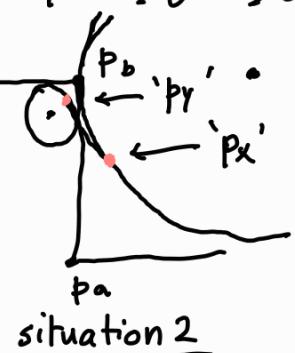
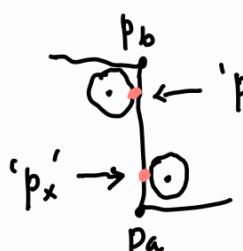
function 2 circles cross tangent  
to be created.

Situation 1

error can be raised if either of the tangent points on the circles, drawn by line  $p_a \rightarrow p_b$  goes beyond The line  $p_a \rightarrow p_b$

Condition 8

$$\begin{array}{cccc} p_a & p_b & r_a & r_b \\ 1 & -1 & >0 & >0 \end{array}$$

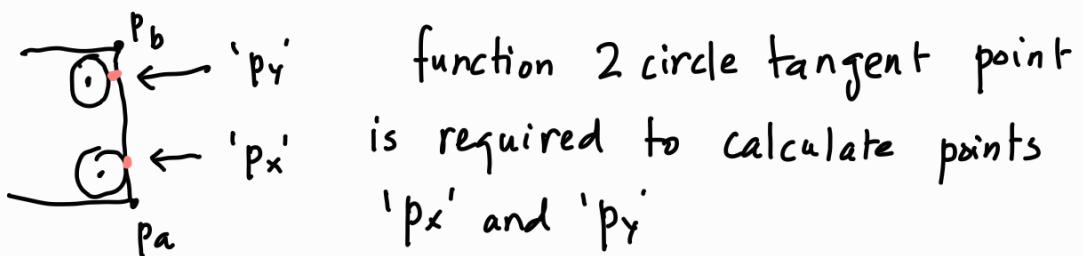


function 2 circle cross tangent

situation 1

error can be raised if either of the tangent points on the circles, drawn by line  $p_a \rightarrow p_b$  goes beyond The line  $p_a \rightarrow p_b$

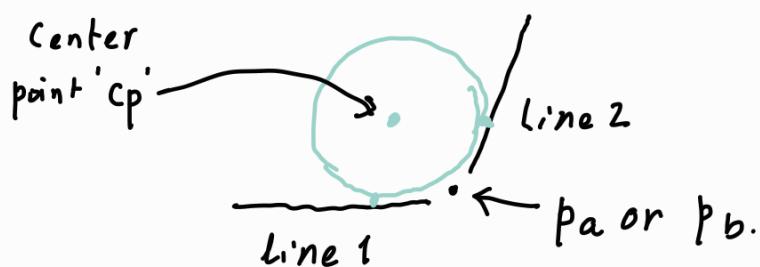
Condition Q	$p_a$	$p_b$	$r_a$	$r_b$
	-1	-1	>0	>0



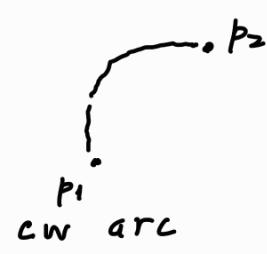
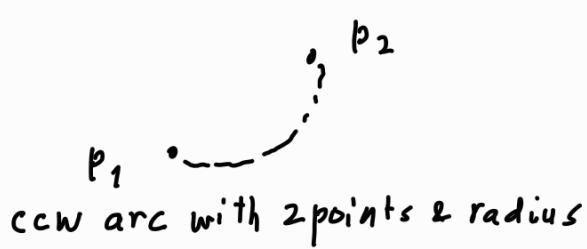
In this case error to be raised if the tangent points ' $p_x$ ' and ' $p_y$ ' cross over

Apart from the above functions following calculations would be required for most of the above "conditions."

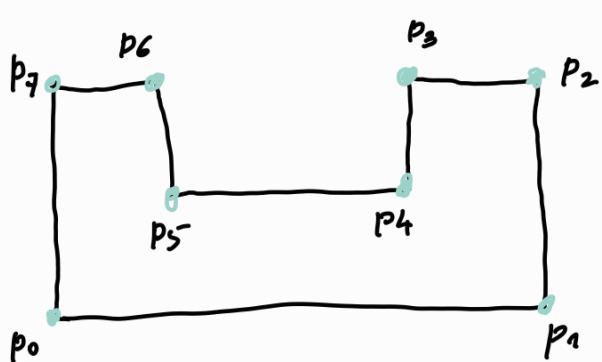
1. for the points where radius is specified, a center point for drawing circle is required such that the circle drawn is tangent to both the lines at the point.



2. function to create an arc where following arc specified.
  - 2 points
  - radius
  - clock wise or counter clockwise.



Now let us consider the example



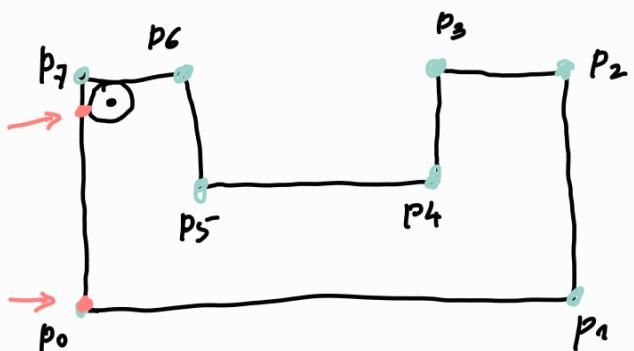
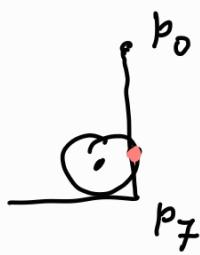
radius list for 7 points

$p_0 \ p_1 \ p_2 \ p_3 \ p_4 \ p_5 \ p_6 \ p_7$

radius  $\rightarrow 0 \ 0 \ 1 \ 1 \ 5 \ 5 \ 1 \ 1$

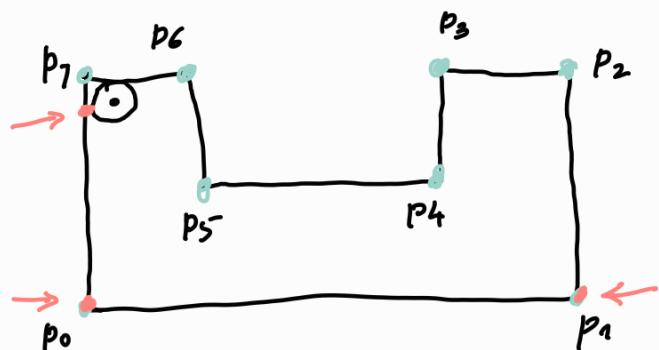
at point  $p_0$

condition



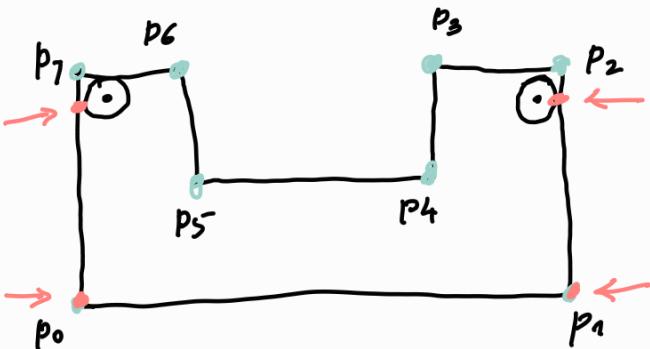
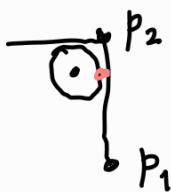
at point  $p_1$

Condition



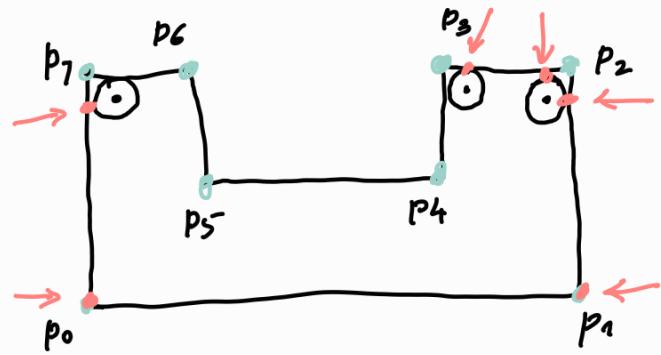
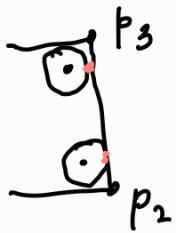
at point  $p_2$

Condition.



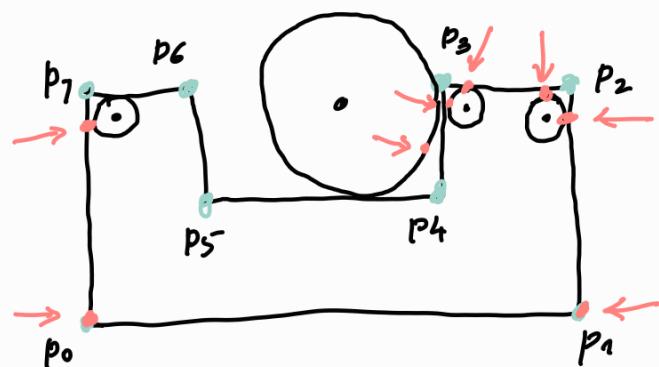
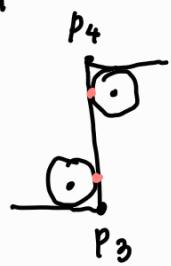
at point  $p_3$

condition



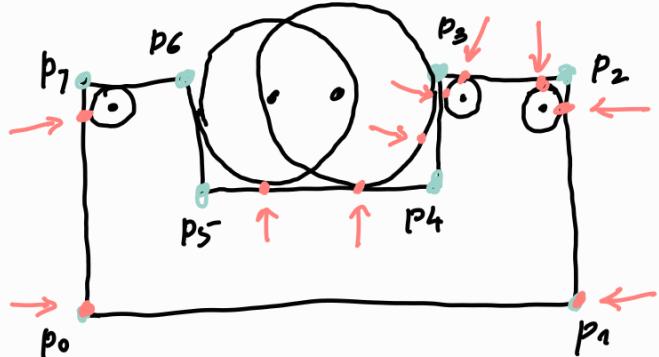
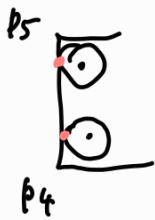
at point  $p_4$

condition



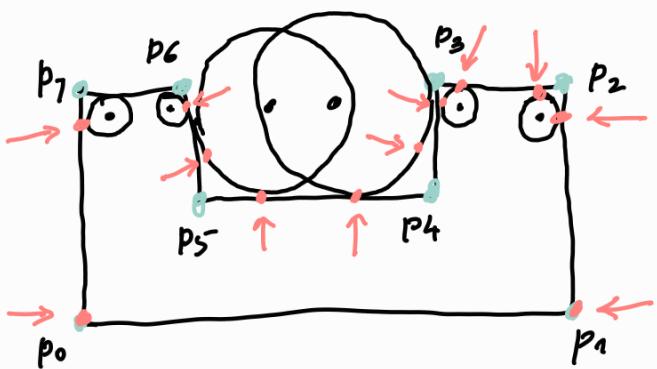
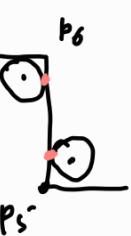
at point  $p_5$

Condition



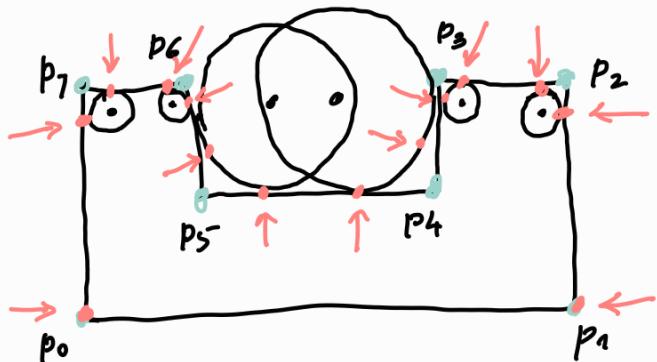
at point  $p_6$

Condition



at point  $P_7$

Condition



with all the above 'red' points now draw section.

