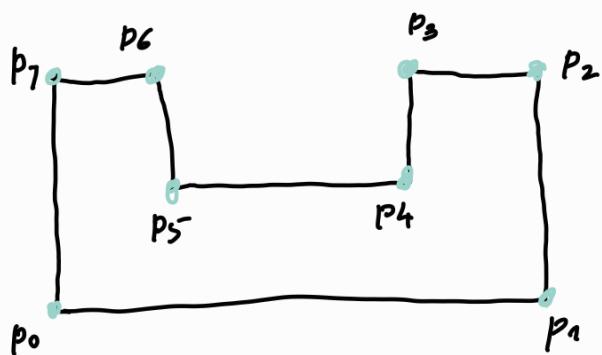


Logic of creating a 2D polygon with rounded corners

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

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

Condition 1 - - 0 0

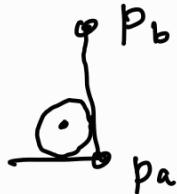
if at both the points p_a and p_b , there is no radius specified, it does not matter how the points are oriented.

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

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

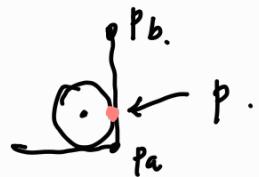
where ever the radius is not specified, orientation of that point is not necessary

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.

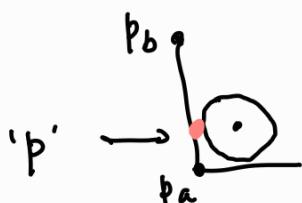


function circle to point tangent
to be created to find point 'p'

error can be raised if radius at p_a is greater than line length $p_a \rightarrow p_b$

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

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



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

error can be raised if radius at p_a is greater than line length $p_a \rightarrow p_b$

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

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

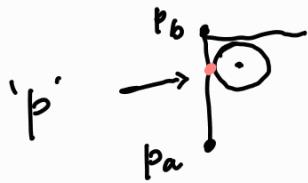


function point to circle tangent

error can be raised if radius at p_b is greater than line length $p_a \rightarrow p_b$

Condition 5

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

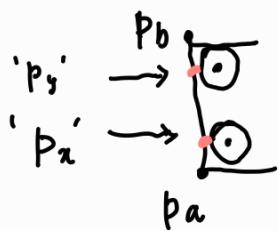


function circle to point tangent

error can be raised if radius at p_b is greater than line length $p_a \rightarrow p_b$

Condition 6

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

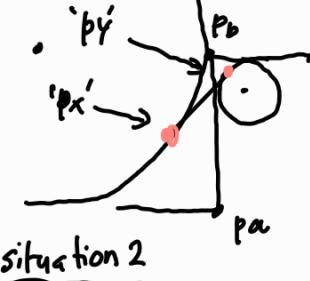
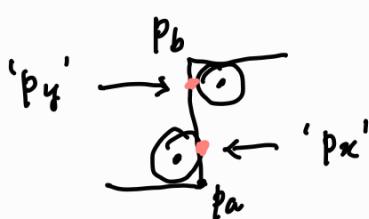


function 2 circle tangent point
to be created to calculate points.
' p_x ' and ' p_y '

In this case error to be raised if sum of radii $>$ line length $p_a \rightarrow p_b$

Condition 7

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



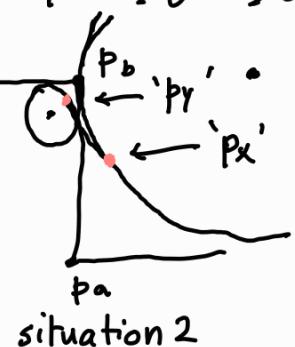
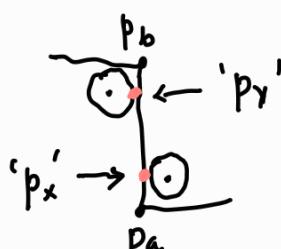
function 2 circles cross tangent
to be created.

Situation 1

error can be raised if either of the radii r_a or r_b is greater than
line length $p_a \rightarrow p_b$

Condition 8

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

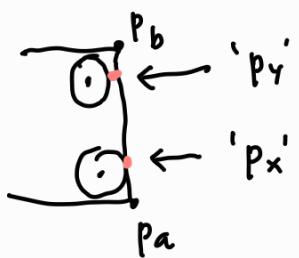


function 2 circle cross tangent

situation 1

error can be raised if either of the radii r_a or r_b is greater than
line length $p_a \rightarrow p_b$

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



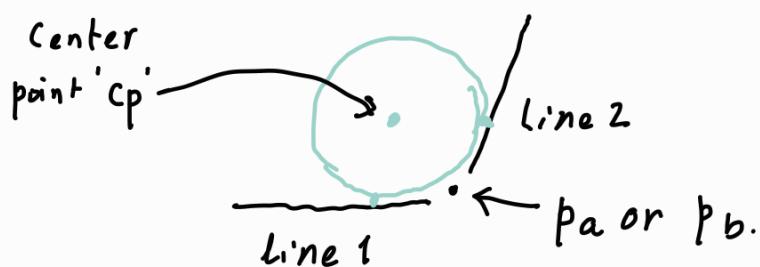
function 2 circle tangent point

is required to calculate points
' p_x ' and ' p_y '

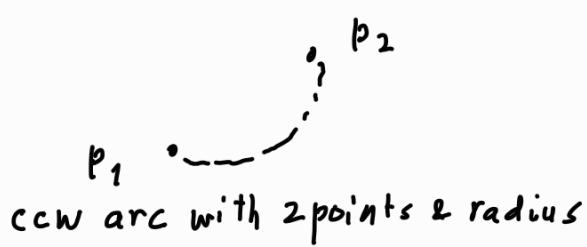
In this case error to be raised if sum of radii > line length $p_a \rightarrow p_b$

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

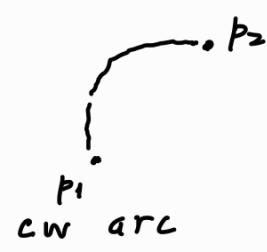
- for the points where radius is specified, a center point for drawing circle is required such that the circle drawn is tangent to both the lines at the point.



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

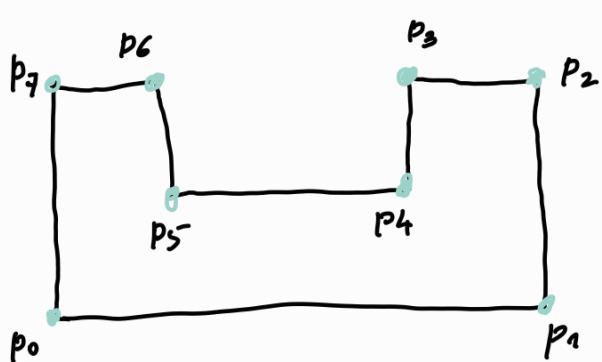


ccw arc with 2points & radius



cw arc

Now let us consider the example



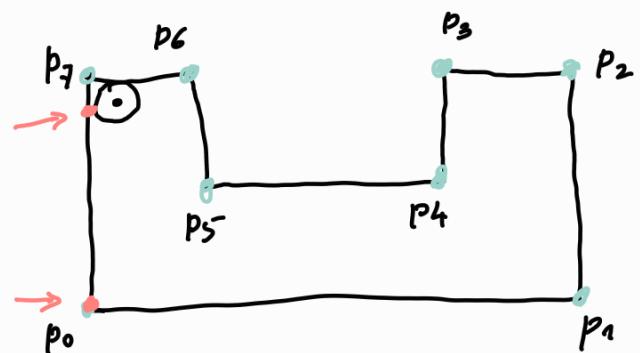
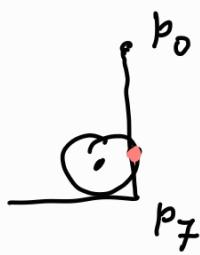
radius list for 7 points

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

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

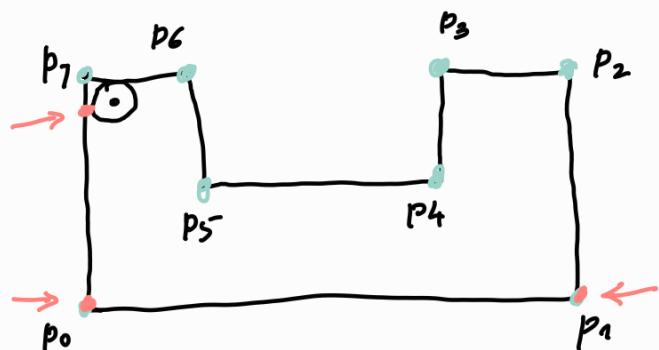
at point p_0

condition



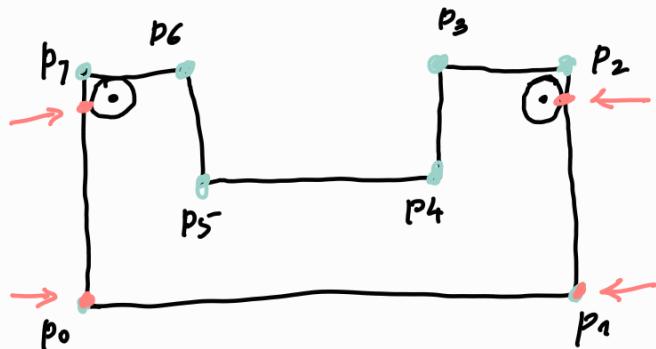
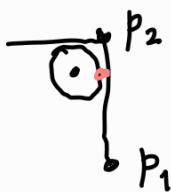
at point p_1

Condition



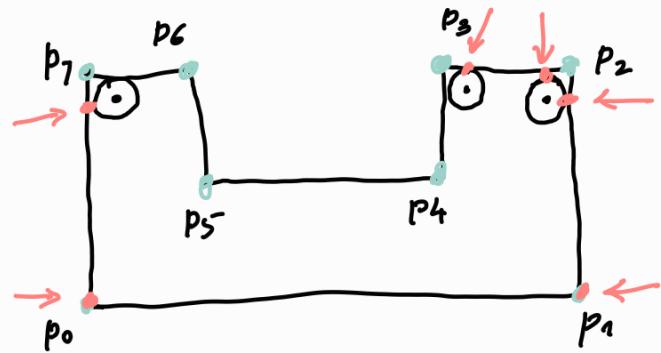
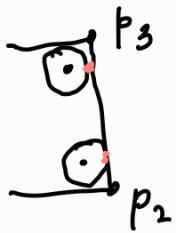
at point p_2

Condition.



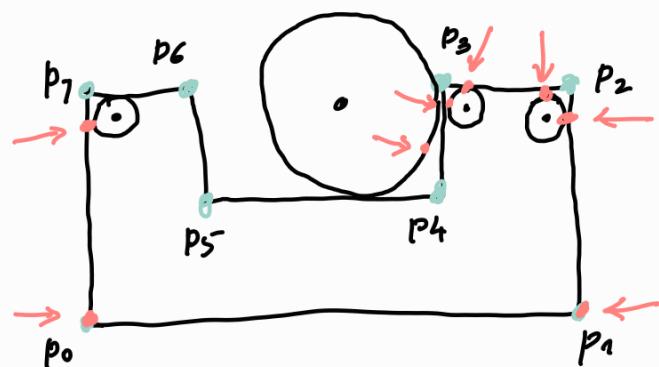
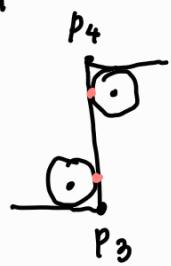
at point p_3

condition



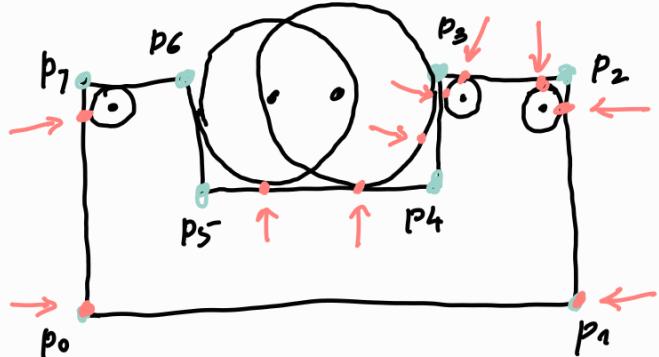
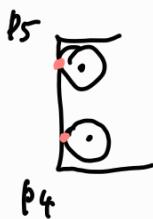
at point p_4

condition



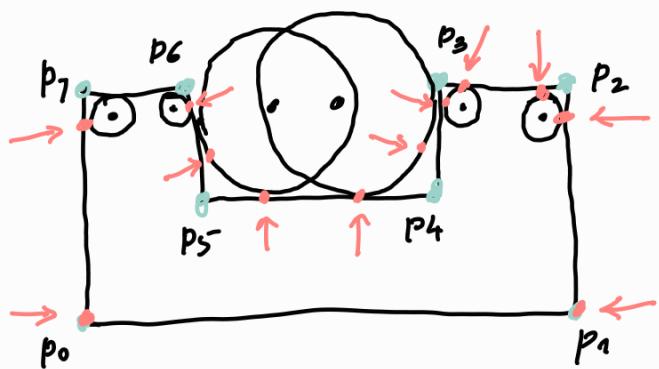
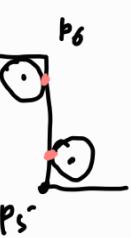
at point p_5

Condition



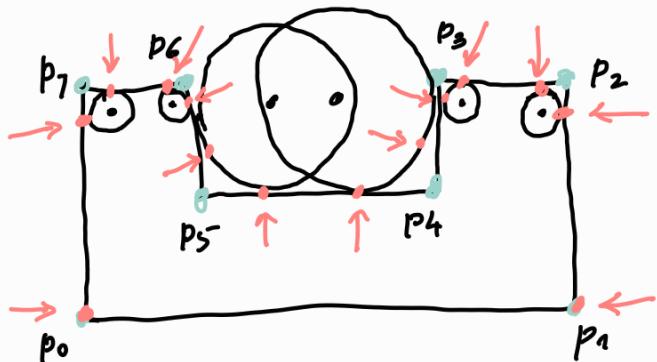
at point p_6

Condition



at point P_7

Condition



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

