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Dr. Tannu Singh

Polygon Clipping :-

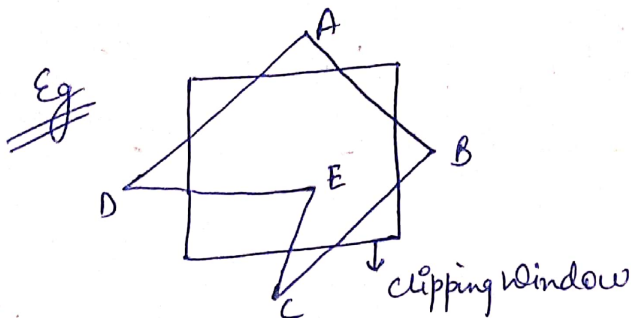
* Sutherland Hodgeman Polygon Clipping Algo :-

↳ It is used for clipping polygon

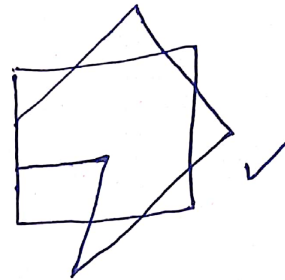
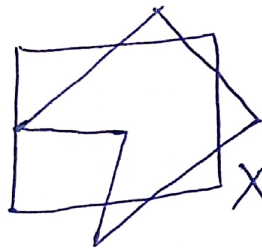
↳ It clips polygon lying outside the window

↳ Clip against each edge of window & obtain new set of vertices

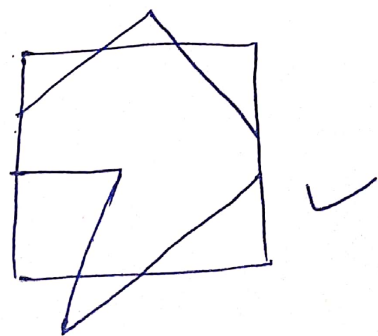
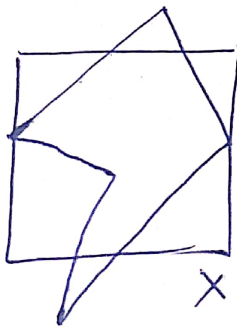
↳ Testing of Algo with respect to Reference of Frame (RoF)



① Left clip \Rightarrow

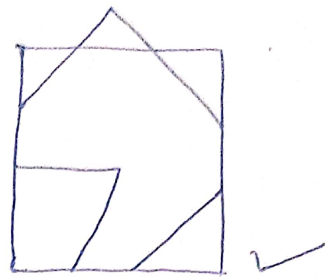
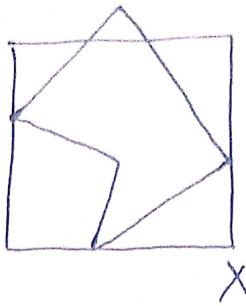


② Right clip \Rightarrow



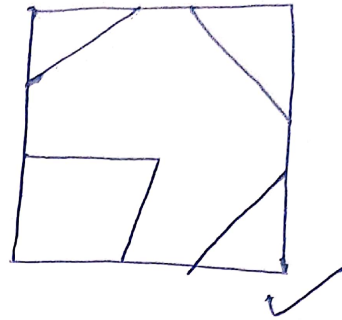
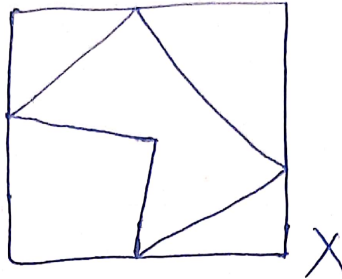
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Bottom clip:

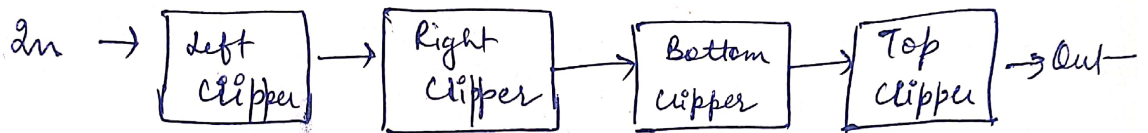


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Top clip:



Algo:-



\rightarrow The Clipping is done based on the boundary

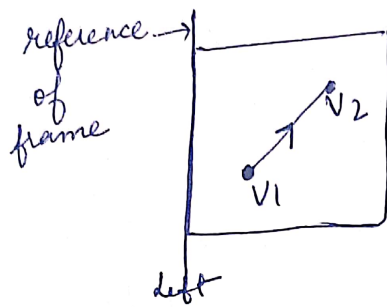
\rightarrow Edge is consider as boundary and respective inside and outside of point is consider for clipping

Q2

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* To find new sequence of vertices, there are 4 cases.

Case 1: when both the input vertices are inside the window boundary (WB).

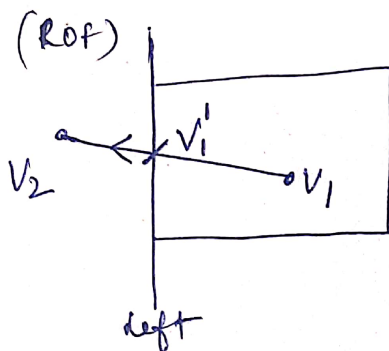


* in \rightarrow in

G/P \rightarrow $V_1 V_2$

O/P \rightarrow Destination vertex = V_2

Case 2: First vertex is inside and second is outside of WB

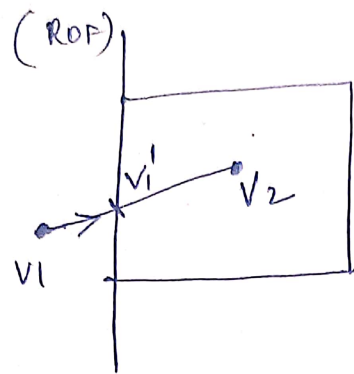


in \rightarrow out

G/P \rightarrow $V_1 V_2$

O/P \rightarrow Intersection pt. = V_1'

Case 3: If first vertex is outside and second vertex is inside of WB



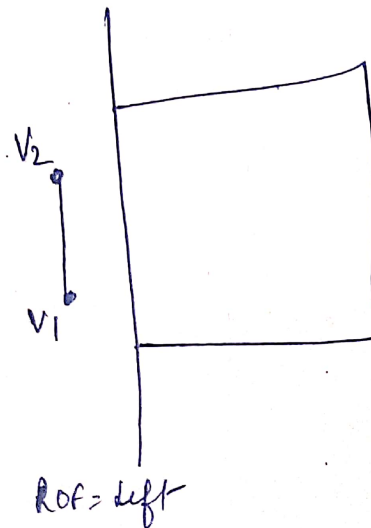
out \rightarrow in

G/P $\rightarrow V_1 V_2$

O/P \rightarrow intersection point + destination point

$\rightarrow V_1' V_2$

Case 4: If both input vertices are outside the WB



out \rightarrow out

G/P $\rightarrow V_1 V_2$

O/P \rightarrow NIL

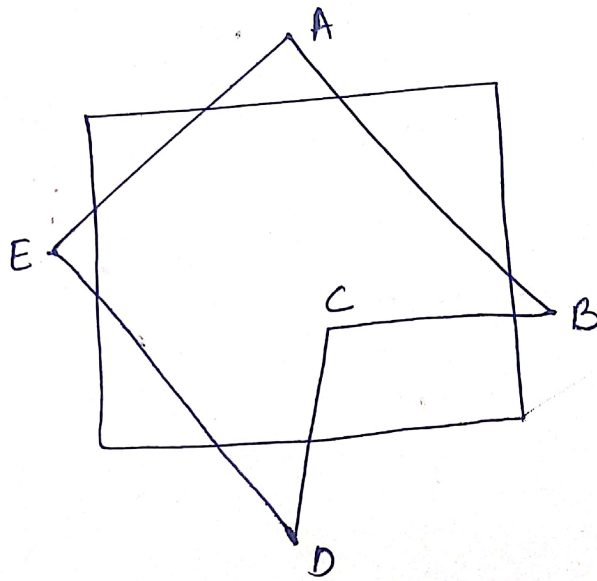
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* Based on the cases we have generate the TT:-

Vertices		Output of Vertices
1 st	2 nd	O/P
in	in	V_2
out	out	NIL
in	out	V_1'
out	in	$V_1' V_2$

Question 1



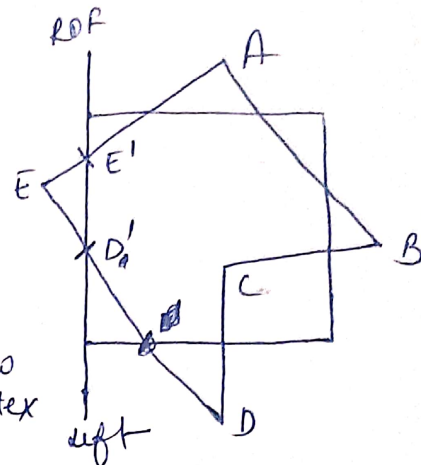
Perform the clipping using sutherland-hodgeman clipping algo.

Solⁿ

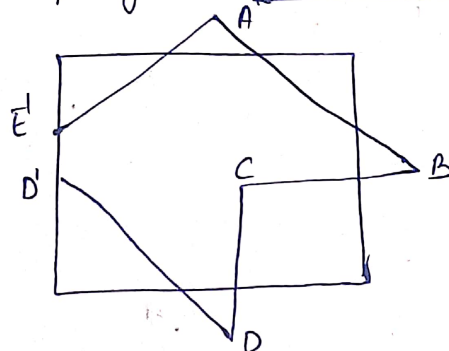
① Start from the ROF = left

Vertex	Case	O/P
AB	in → in	B
BC	in → in	C
CD	in → in	D
DE	in → out	D'
EA	out → in	E'A

New vertex



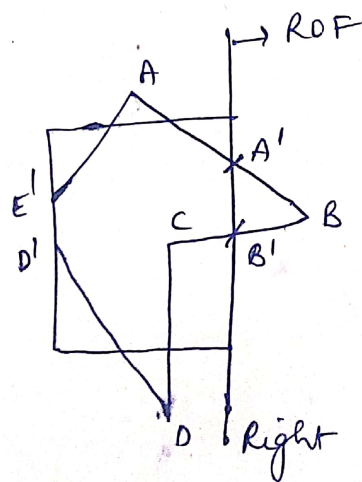
✳ After clipping against ROF left



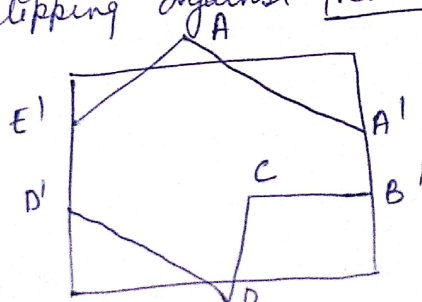
② ROF = Right

Vertex	Case	O/P
AB	in → out	A'
BC	out → in	B'C
CD	in → in	D
DD'	in → in	D'
D'E'	in → in	E'
E'A	in → in	A

New vertex



✳ After clipping against ROF = Right



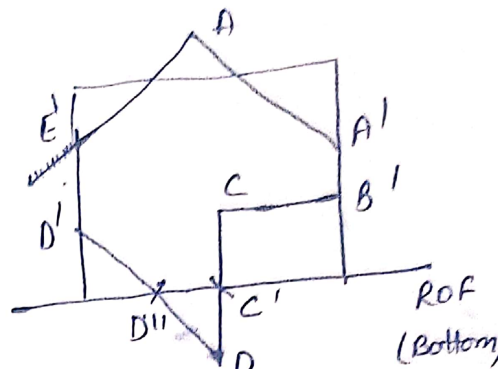
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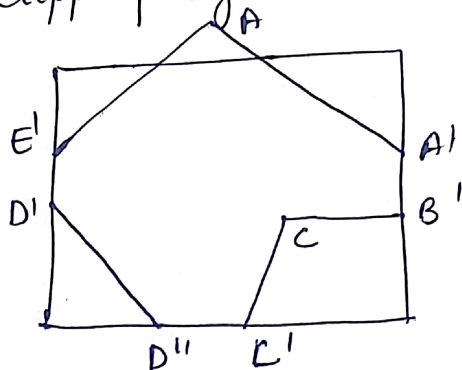
③ ROF = Bottom

Vertex	Case	O/P
AA'	in → in	A'
A'B'	in → in	B'
B'C	in → in	C
CD	in → out	C'
DD'	out → in	D'' D'
D'E'	in → in	E'
E'A	in → in	A

} New Vertex



* After Clipping against ROF = Bottom



④ ROF = TOP

Vertex	Cases	O/P
AA'	out → in	A'' A' → New Vertex
A'B'	in → in	B'
B'C	in → in	C
CC'	in → in	C'
CD''	in → in	D''
D''D'	in → in	D'
D'E'	in → in	E'
E'A	in → out	E'' → New Vertex

