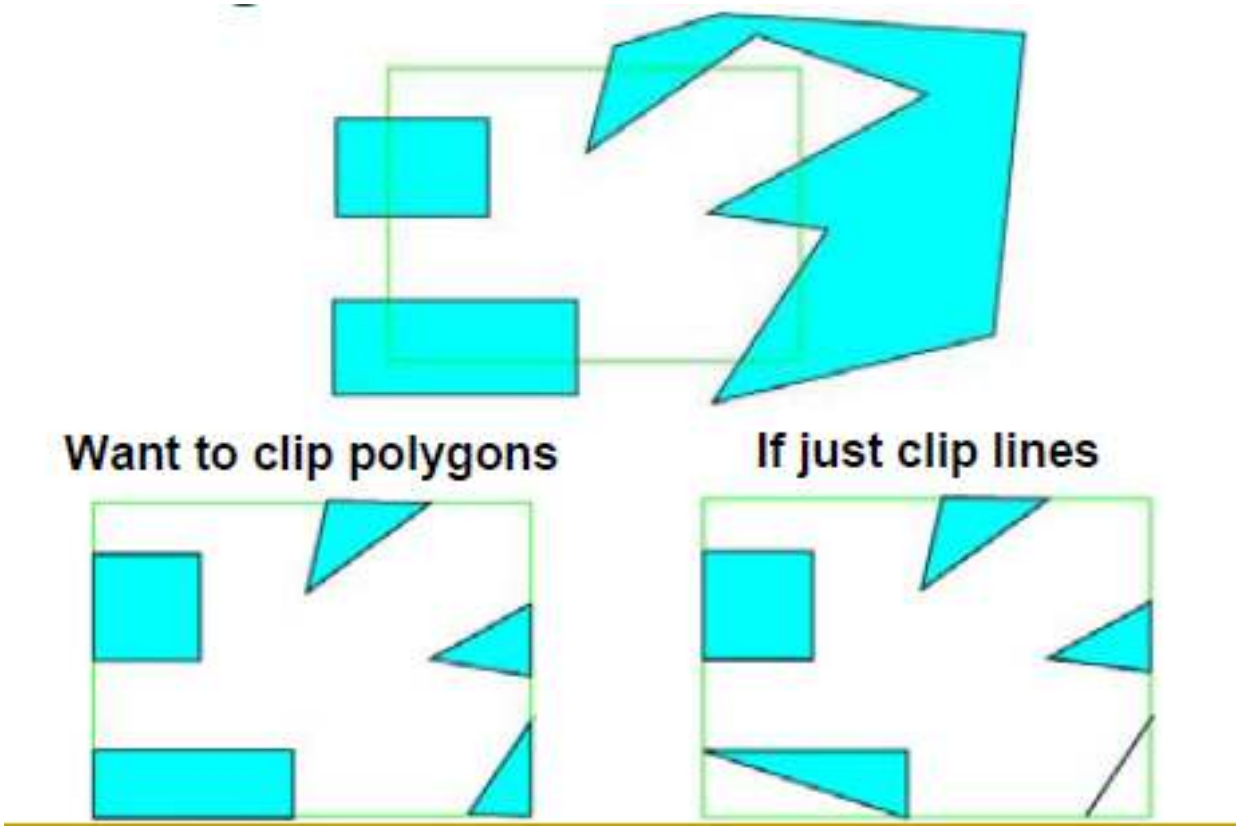
Polygon Clipping



Sutherland-Hodgeman polygon Clipping (convex)

Divide and Conquer algorithm

Process all polygon vertices against each clip rectangle boundary in turn.

-clip polygon against left window boundary.

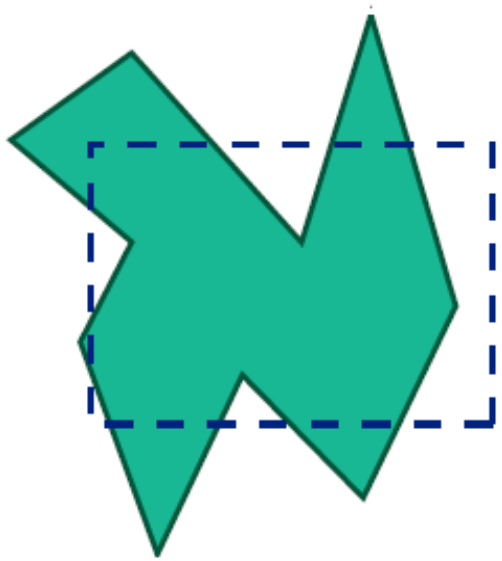
-pass new sequence of vertices successively to right ,bottom and top boundary clipper.

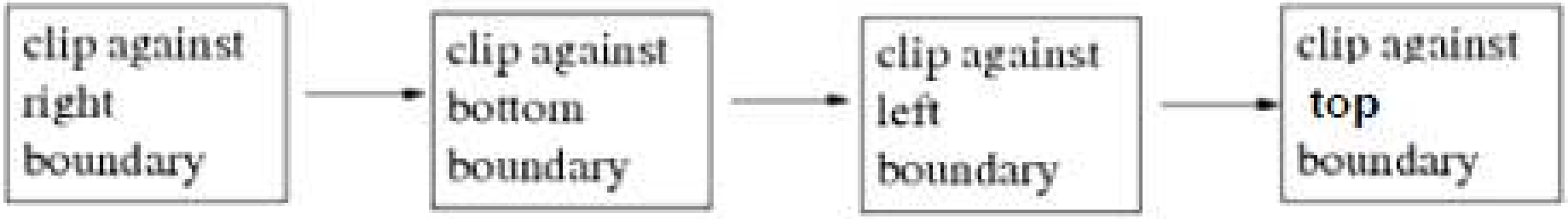
Four test cases for all clipper:

1. First vertex inside and the second outside (in-out pair)
2. Both vertices inside clip window
3. First vertex outside and the second inside (out-in pair)
4. Both vertices outside the clip window

Continue….

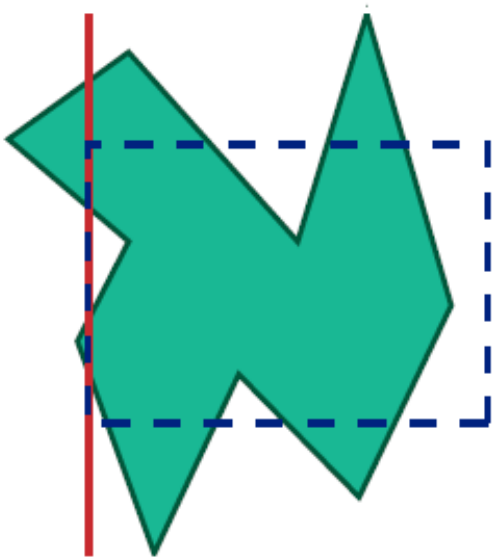
Sutherland-Hodgeman Algorithm





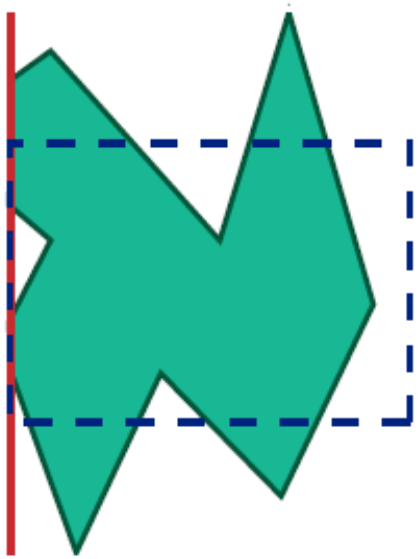
Continue….

Sutherland-Hodgeman Algorithm (Left Cut)



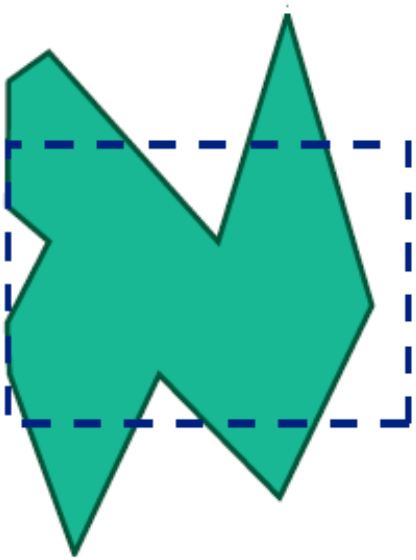
Continue….

Sutherland-Hodgeman Algorithm (Left Cut)



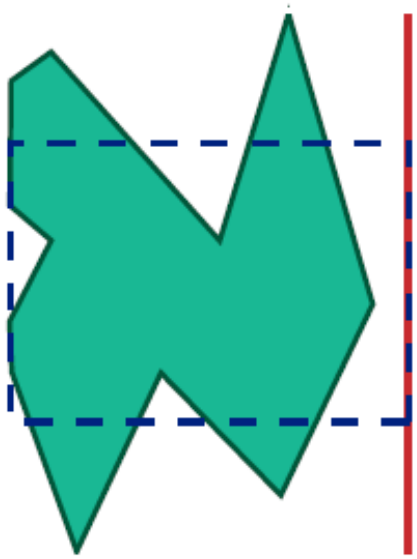
Continue….

Sutherland-Hodgeman Algorithm (Left Cut)



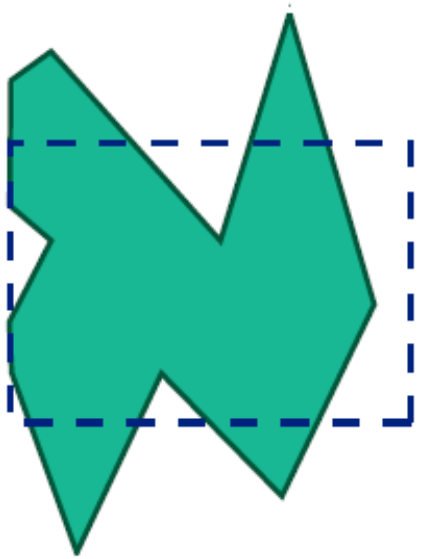
Continue….

Sutherland-Hodgeman Algorithm (Right Cut)



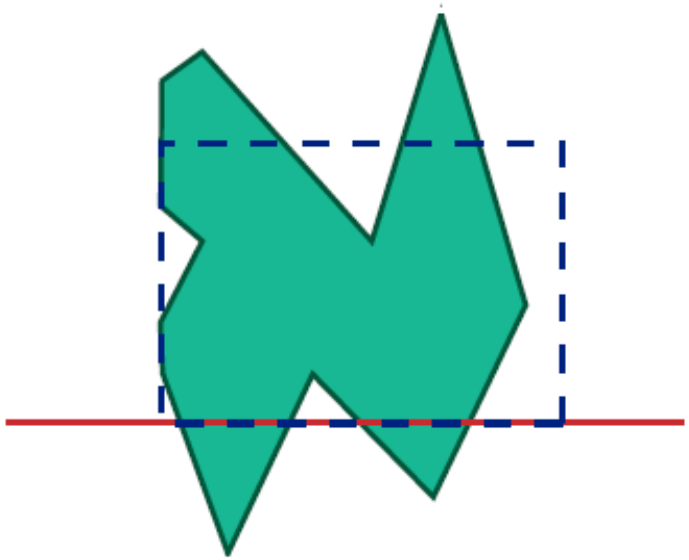
Continue….

Sutherland-Hodgeman Algorithm (Right Cut)



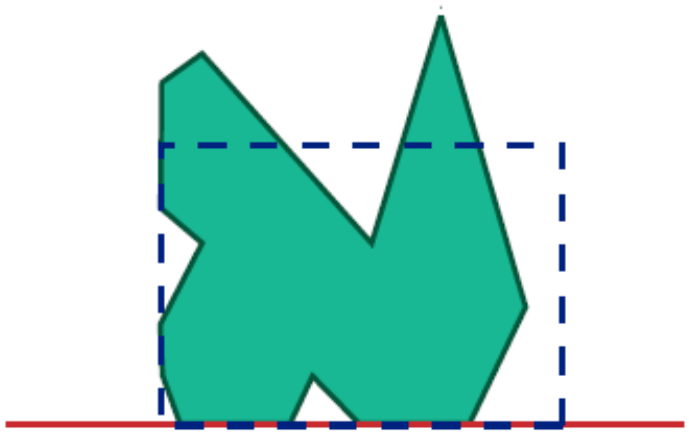
Continue….

Sutherland-Hodgeman Algorithm (Bottom Cut)



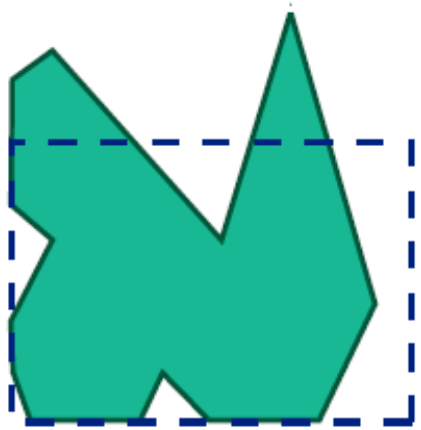
Continue….

Sutherland-Hodgeman Algorithm (Bottom Cut)



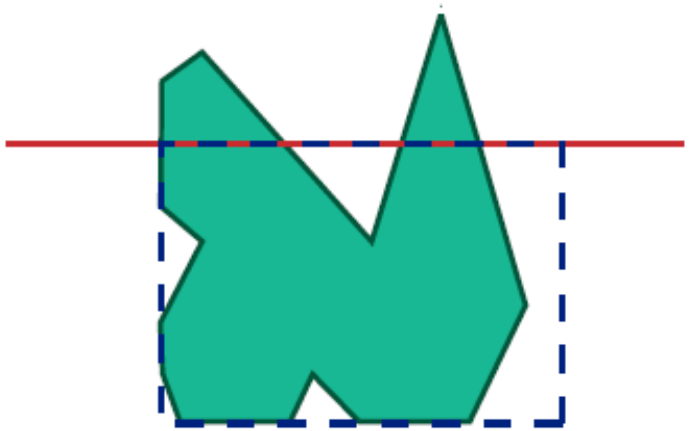
Continue….

Sutherland-Hodgeman Algorithm (Bottom Cut)



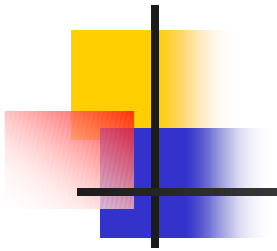
Continue….

Sutherland-Hodgeman Algorithm (Top Cut)



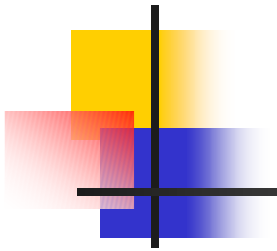
Continue….

Sutherland-Hodgeman Algorithm (Top Cut)



Continue….

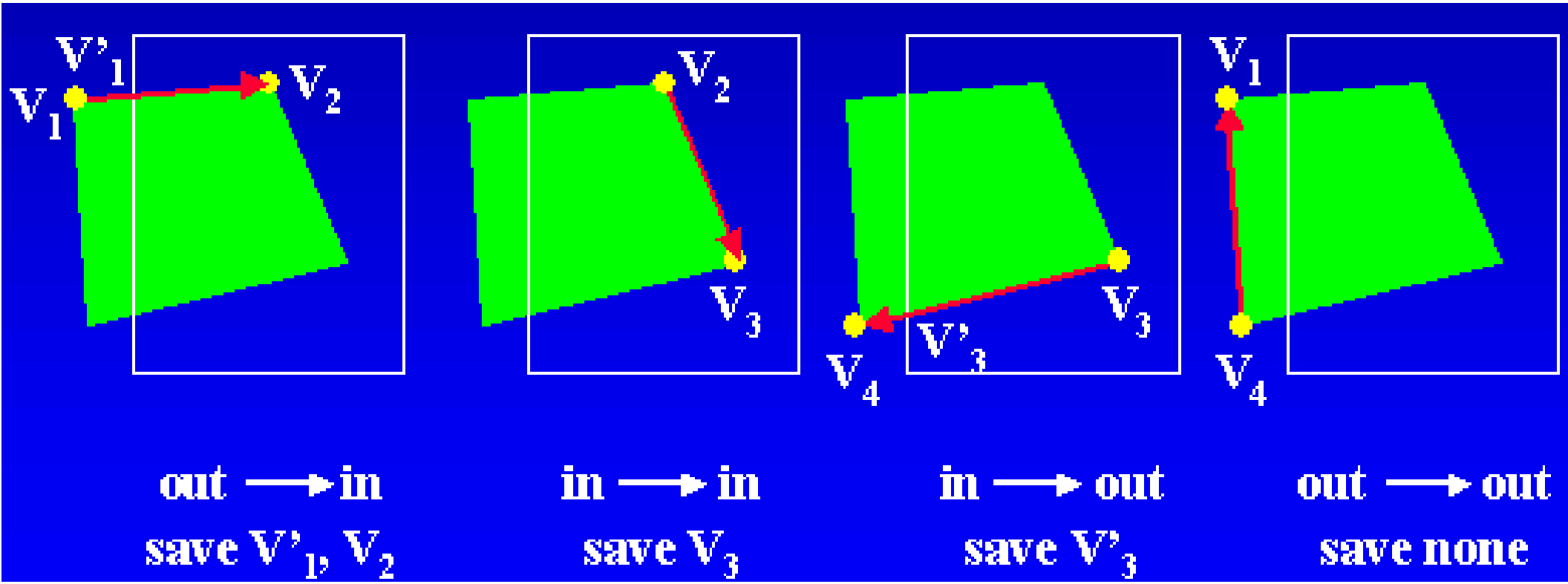
Sutherland-Hodgeman Algorithm (Top Cut)

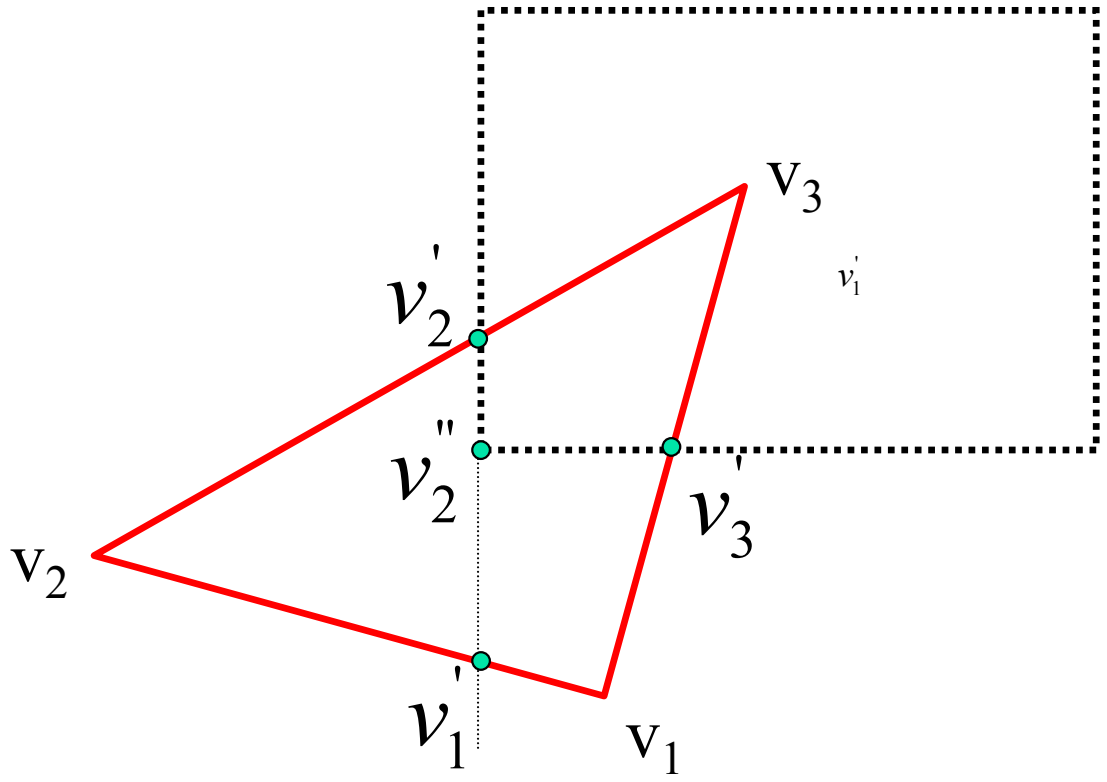


Continue….

Sutherland-Hodgeman Algorithm (Final)

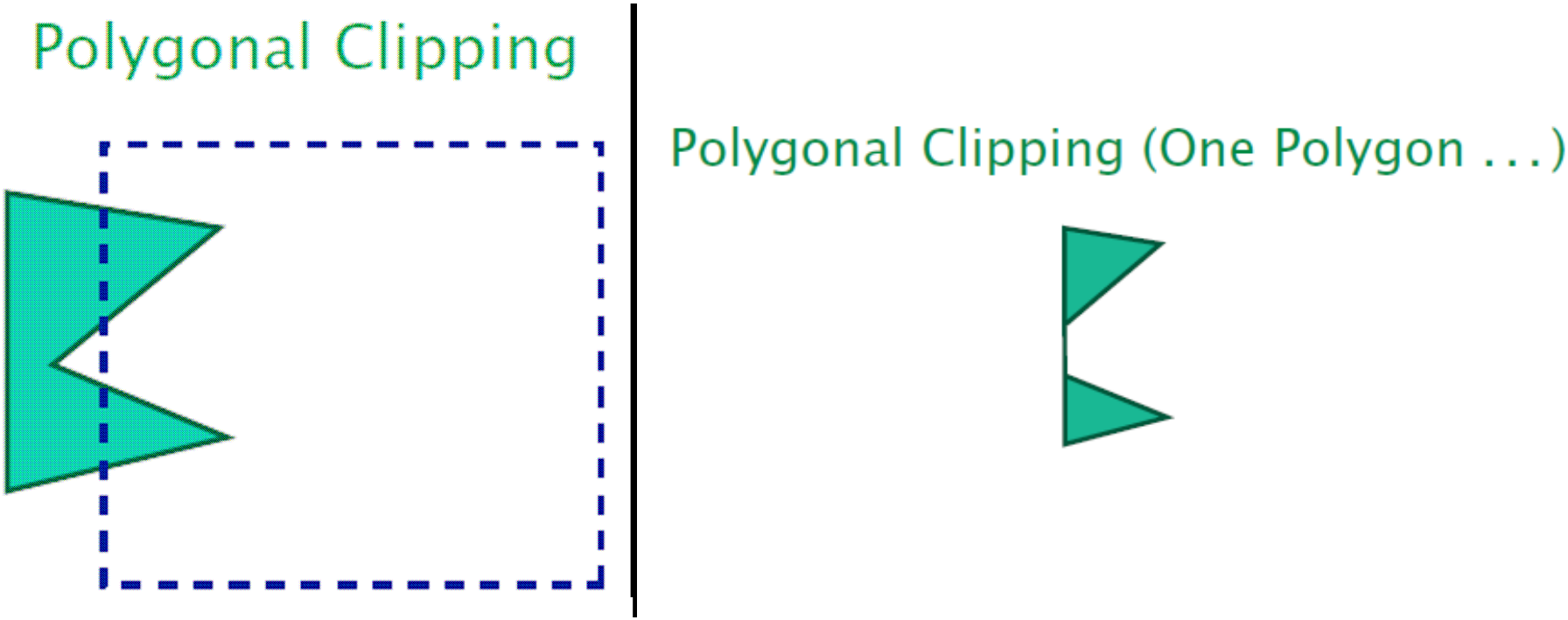
Continue….


V'1
V1
V2
V2
V3
V4
V'3
V3
V1
V4
out → in
save V'1, V2
in → in
save V3
in → out
save V'3
out → out
save none

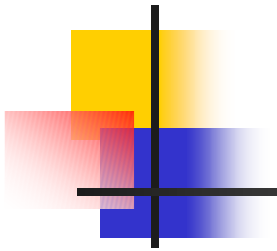

v3
v'1
v'2
v''2
v'3
v2
v'1
v1

By Jignesh Patel

Weiler-Atherton Polygon Clipping (concave)



Clipping concave polygon using Sutherland-Hodgeman produce two connected areas in next figure

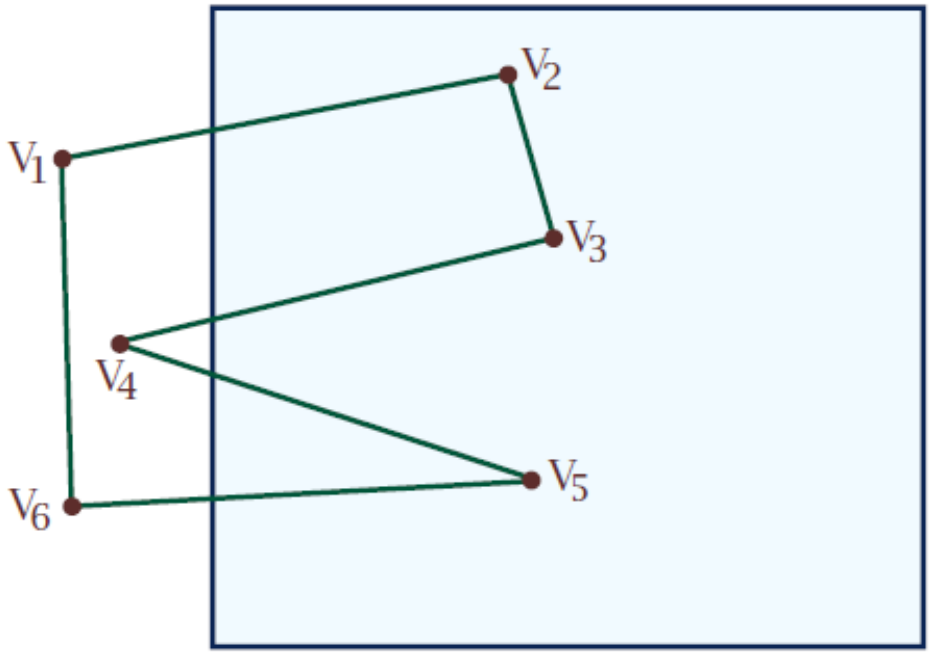


Continue….

- As before,the algorithm is given a list of vertices that defines a single polygon.The output of the algorithm is a list of vertex lists,representing one or more clipped polygons.
- Proceeding clockwise around the original polygon vertex list,perform the following:
  - If a line segment enters the clip region (outside-to-inside vertex pair),add the intersection to the output list, follow the polygon boundary.
  - If a line segment leaves the clip region (an inside-to-outside vertex pair),add the intersection to the output list, follow the boundary of the clip region, clockwise.

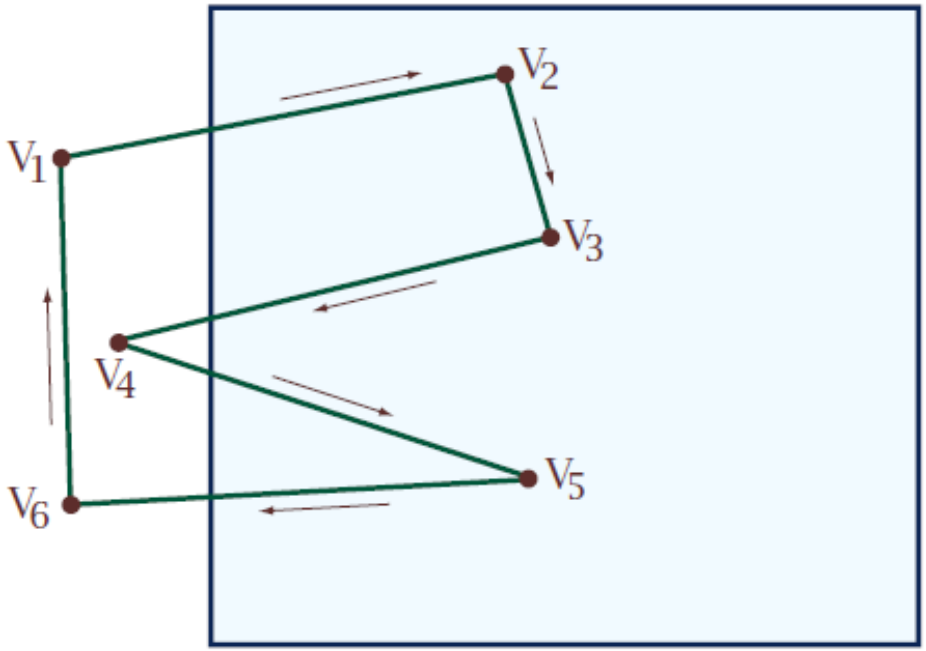
Continue….

Polygonal Clipping: Weiler-Atherton Algorithm



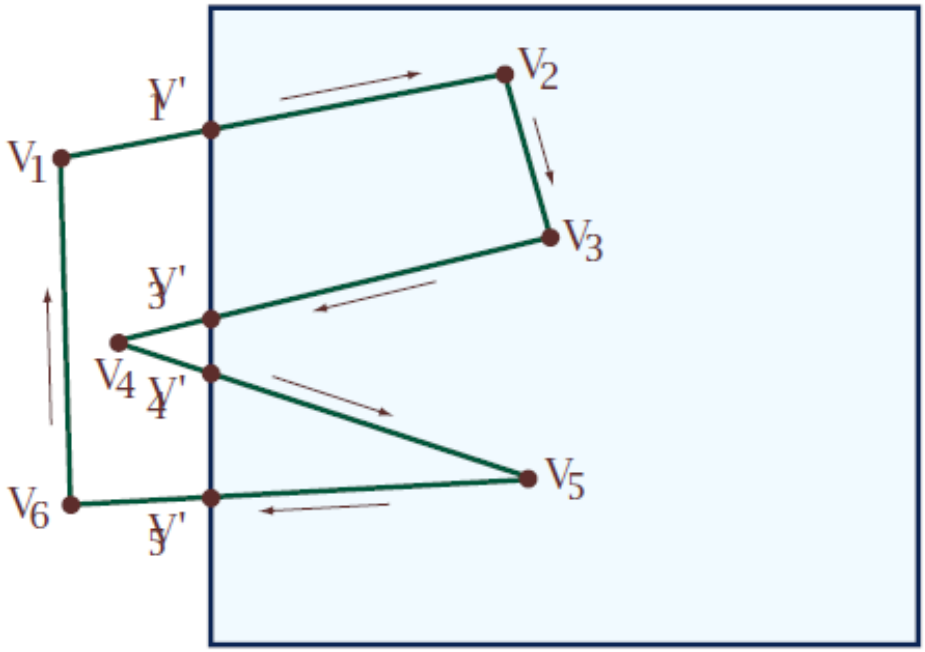
Continue….

Polygonal Clipping: Weiler-Atherton Algorithm



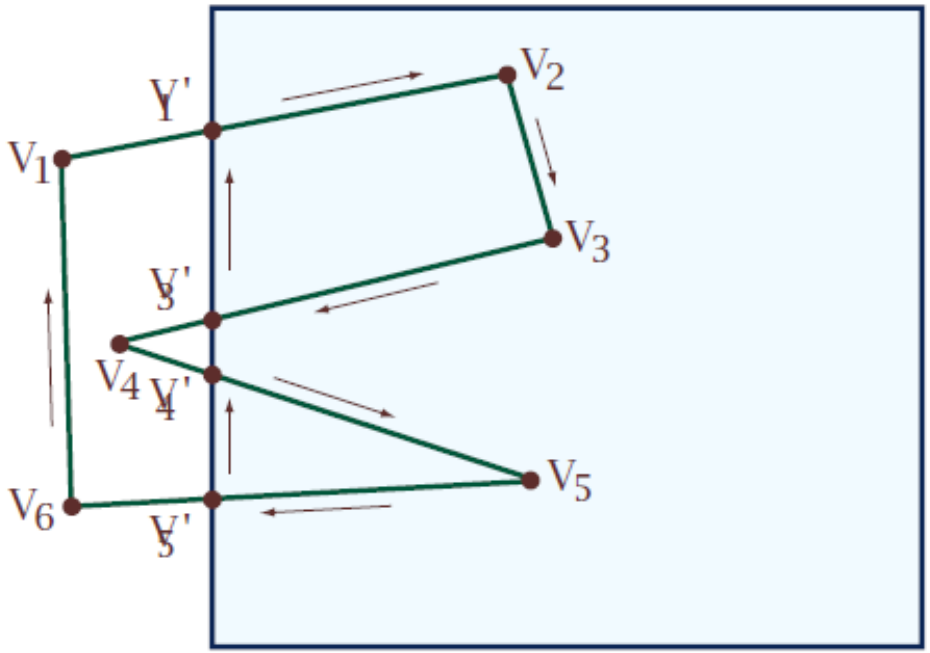
Continue….

Polygonal Clipping: Weiler-Atherton Algorithm



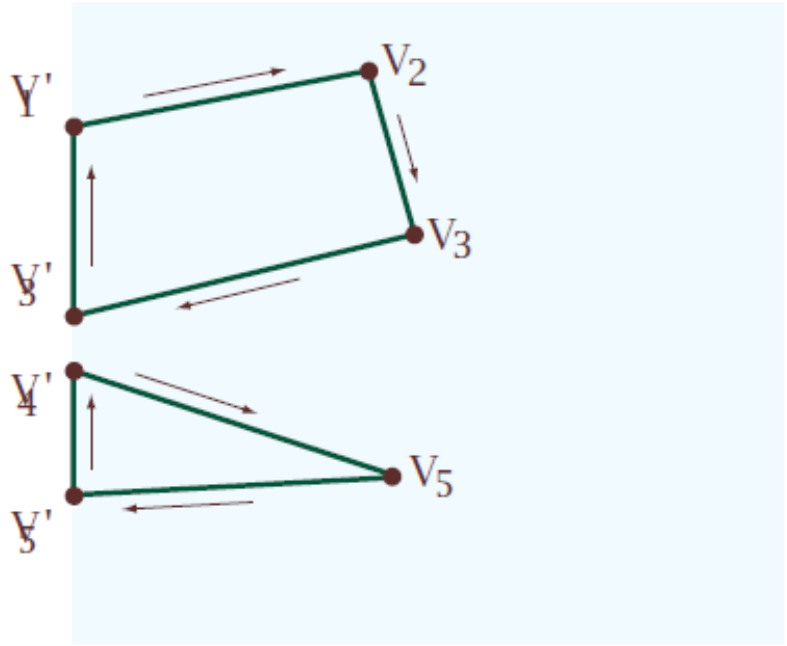
Continue….

Polygonal Clipping: Weiler-Atherton Algorithm



Continue….

Polygonal Clipping: Weiler-Atherton Algorithm



Continue….

Counterclockwise processing

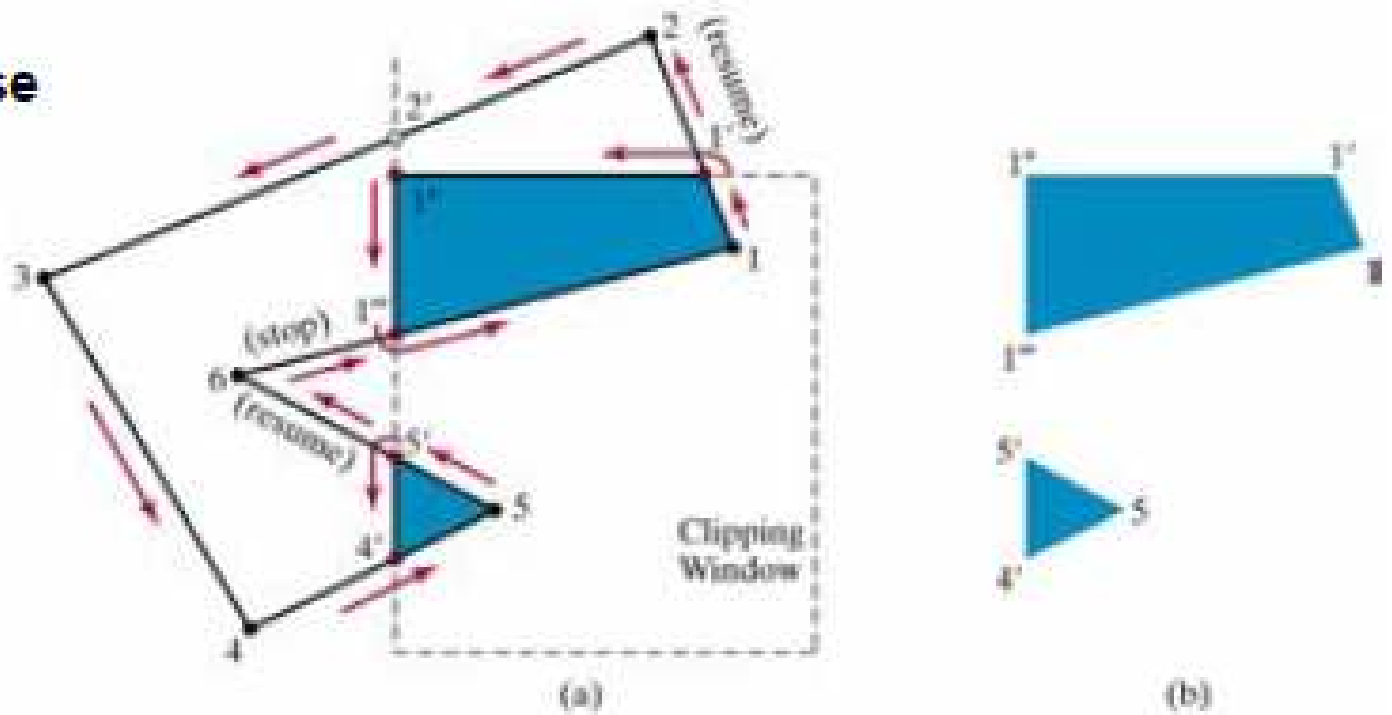
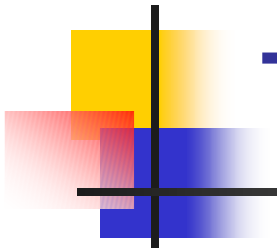


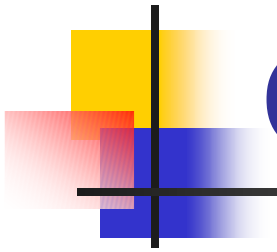
Figure 6-29

A concave polygon (a), defined with the vertex list {1, 2, 3, 4, 5, 6}, is clipped using the Weiler-Atherton algorithm to generate the two lists {1, 1', 1'', 1'''} and {4', 5, 5'}, which represent the separate polygon fill areas shown in (b).



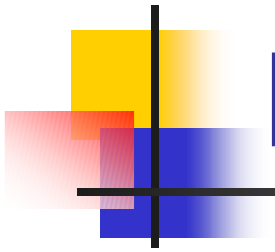
Text Clipping

- *All-or-none string-clipping* strategy
- *All-or-none character-clipping* strategy
- *Clip the components of individual characters*



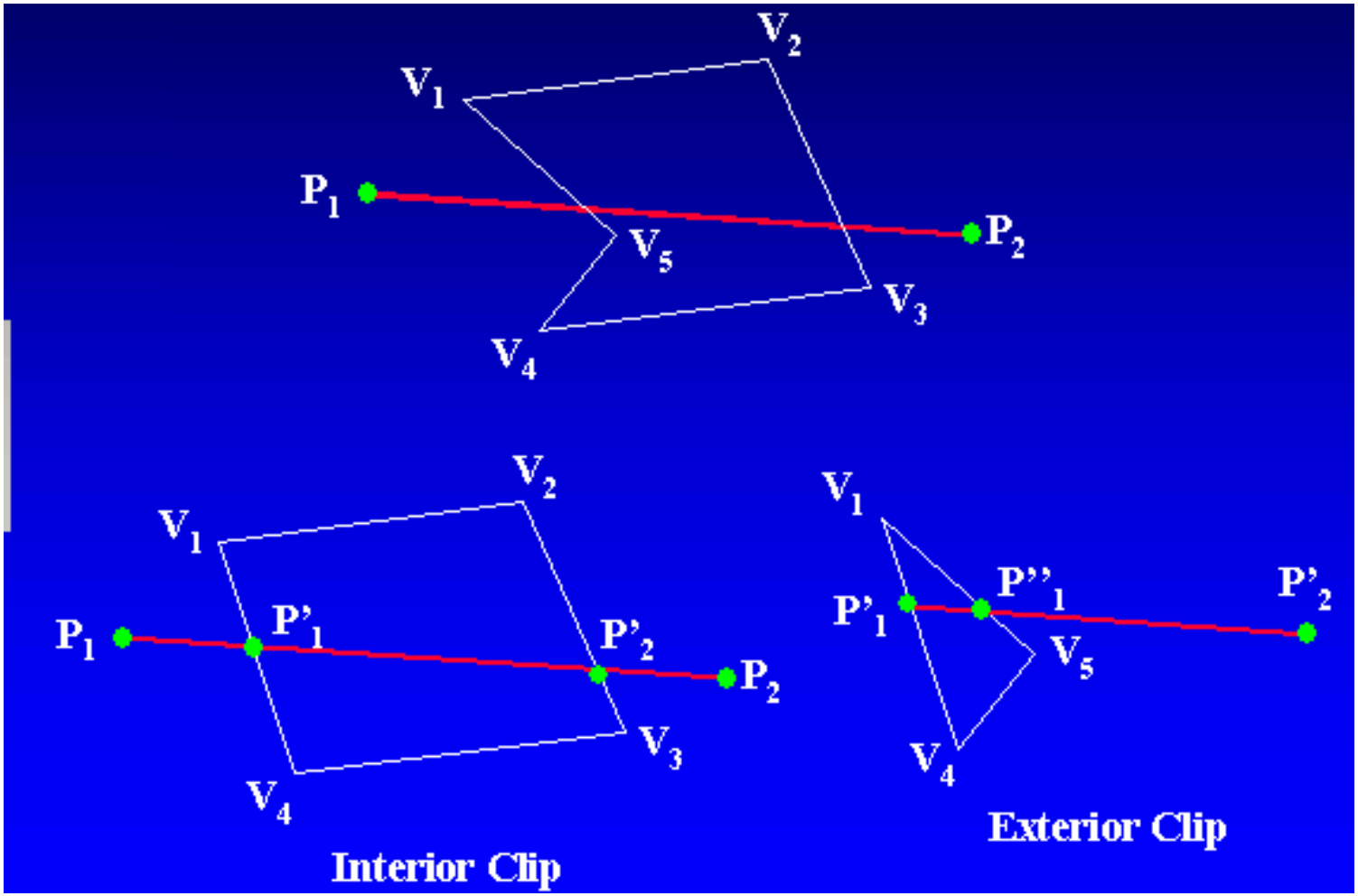
Curve Clipping

- Use bounding rectangle to test for overlap with a rectangular clip window



Exterior Clipping

- Save the outside region.
- Applications
  - Multiple window systems.
  - The design of page layouts in advertising or publishing .
  - Adding labels or design patterns to a picture.


V2
V1
P1
P2
V5
V3
V4
V2
V1
P1
P'1
P'2
P2
V3
V4
Interior Clip
V1
P'1
P''1
P'2
V5
V4
Exterior Clip