

ECE/CS 412

Introduction to Computer Graphics

Class 12

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Advanced Graphics Lab



Last time

- Orthographic transformation



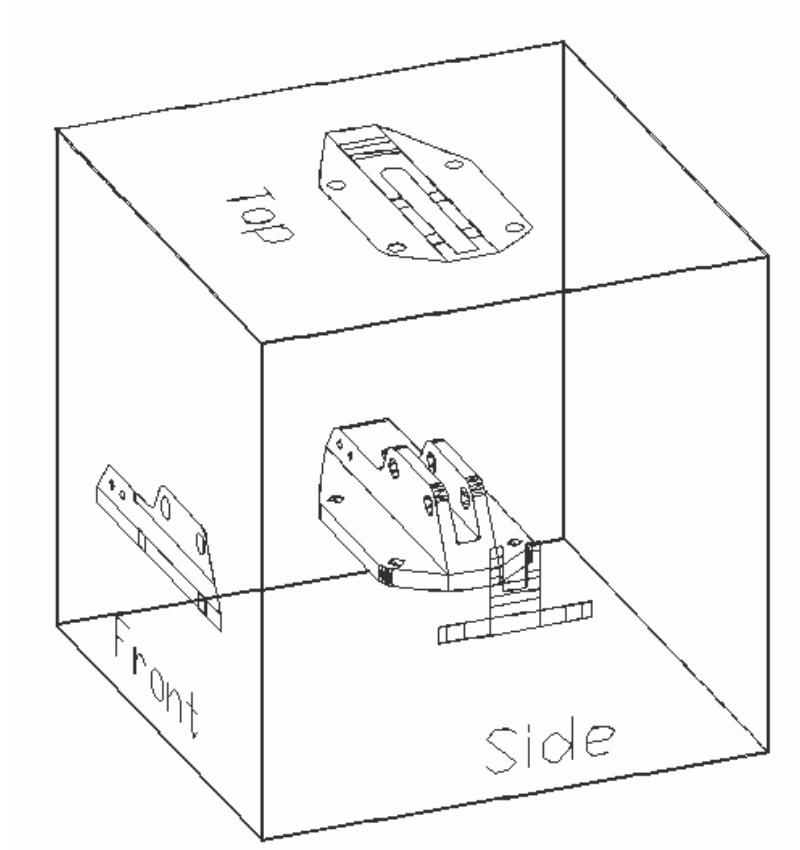
Today

- Perspective projection
- Clipping
- Rasterization



Orthographic projection

- Often used in CAD



Perspective projection

- Orthographic projection did not depict the scene as perceived by an individual
- The Renaissance introduced a new way of thinking: the power of the individual
- Desire to represent the world as experienced by an individual, not an all-seeing god.
- Missing in much of the artwork that was not influenced by the Renaissance...

Eastern art at the time of the renaissance

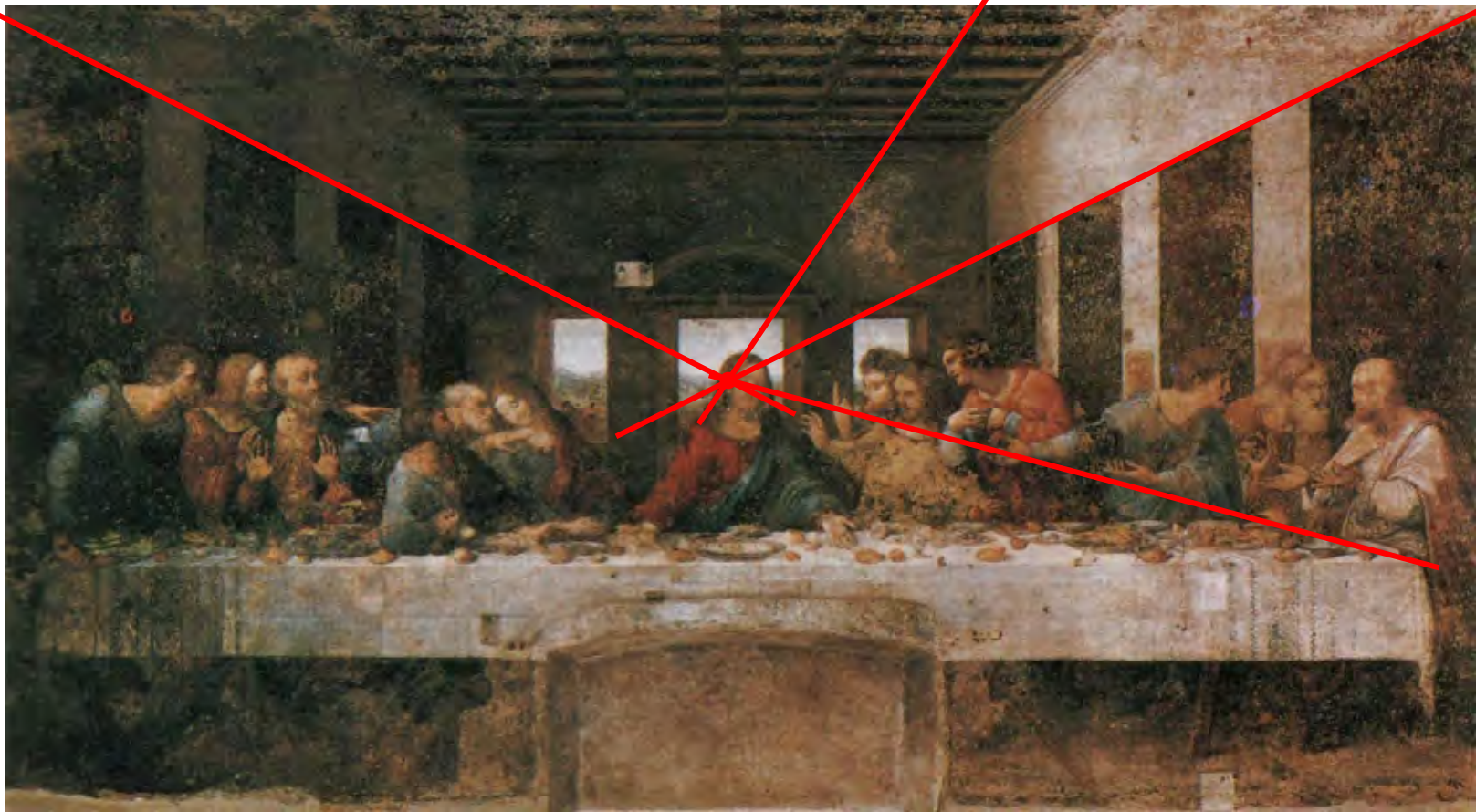


Baburnama (1530)

Development of perspective projection

- During the Renaissance, perspective projection came about as a way of representing the individual's view point

The Last Supper

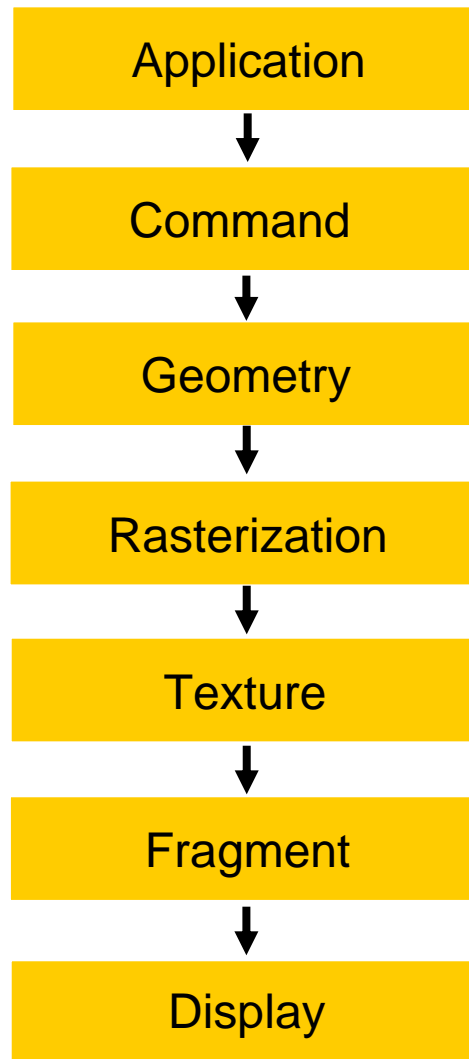


The Last Supper - Leonardo DaVinci (1495 – 1498)

Perspective Projection

- Derivation of perspective matrix

Graphics pipeline



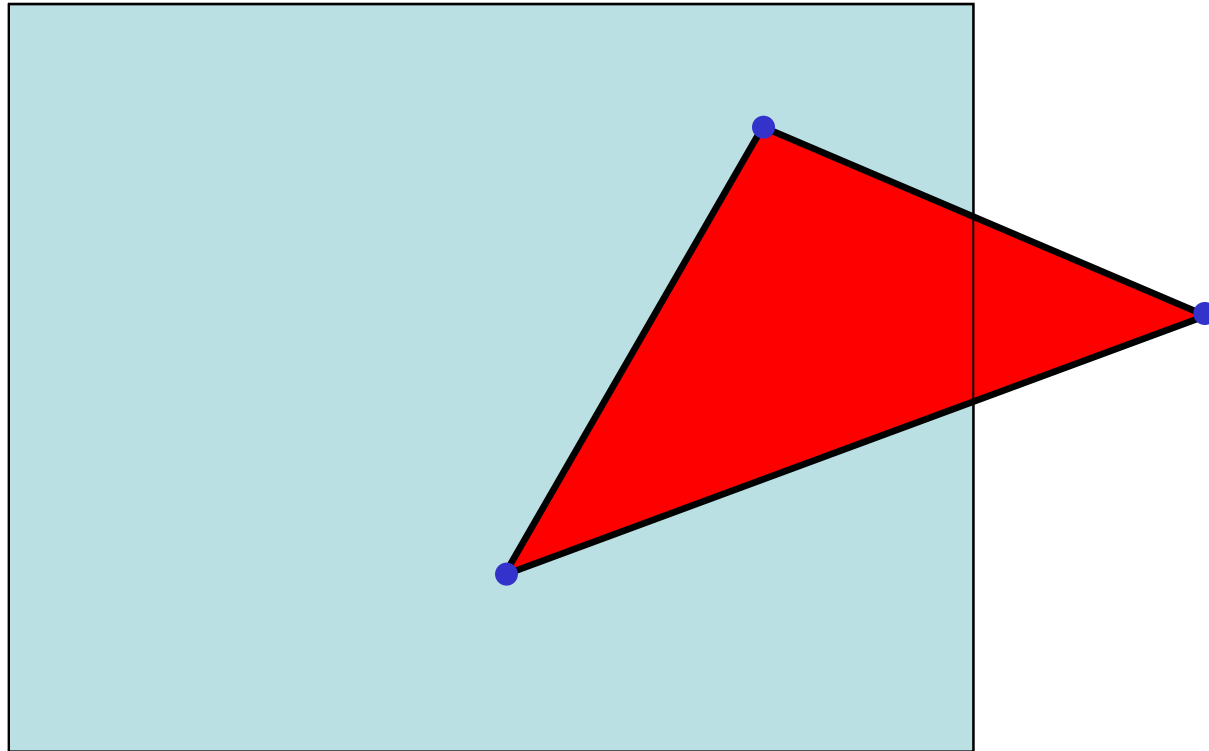
Clipping algorithm

- Naïve:
 - Do it while rasterizing!
 - Rasterize the entire triangle, reject the fragment if it is outside the window
 - This is essentially scissoring, which we will talk about later...
 - Works, but you waste a lot of time rasterizing fragments that don't end up in the screen

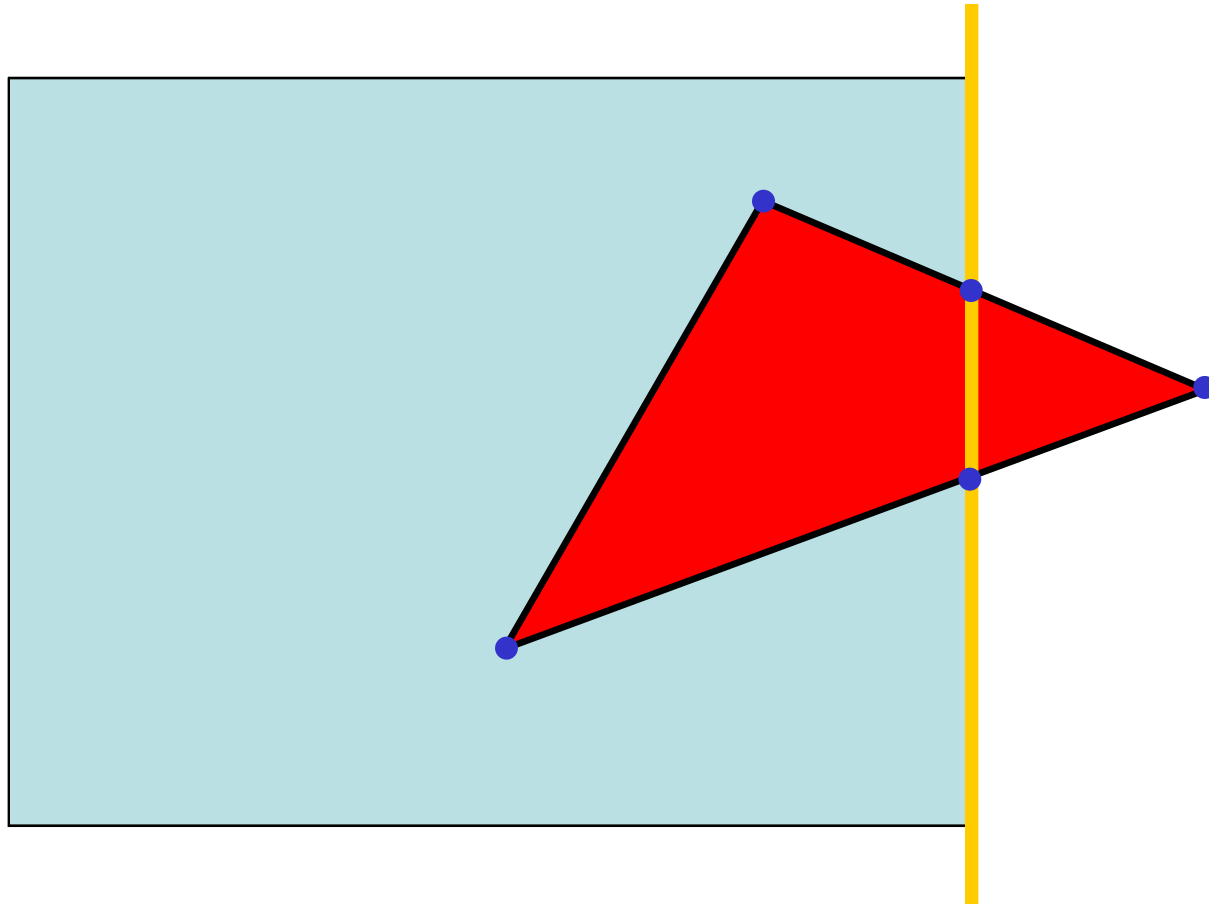
Clipping algorithm

- More sophisticated:
 - Variation of Sutherland-Hodgman polygon clipping algorithm
 - Clip triangle against each edge in turn to create new triangles.
 - Clip these against other edges...

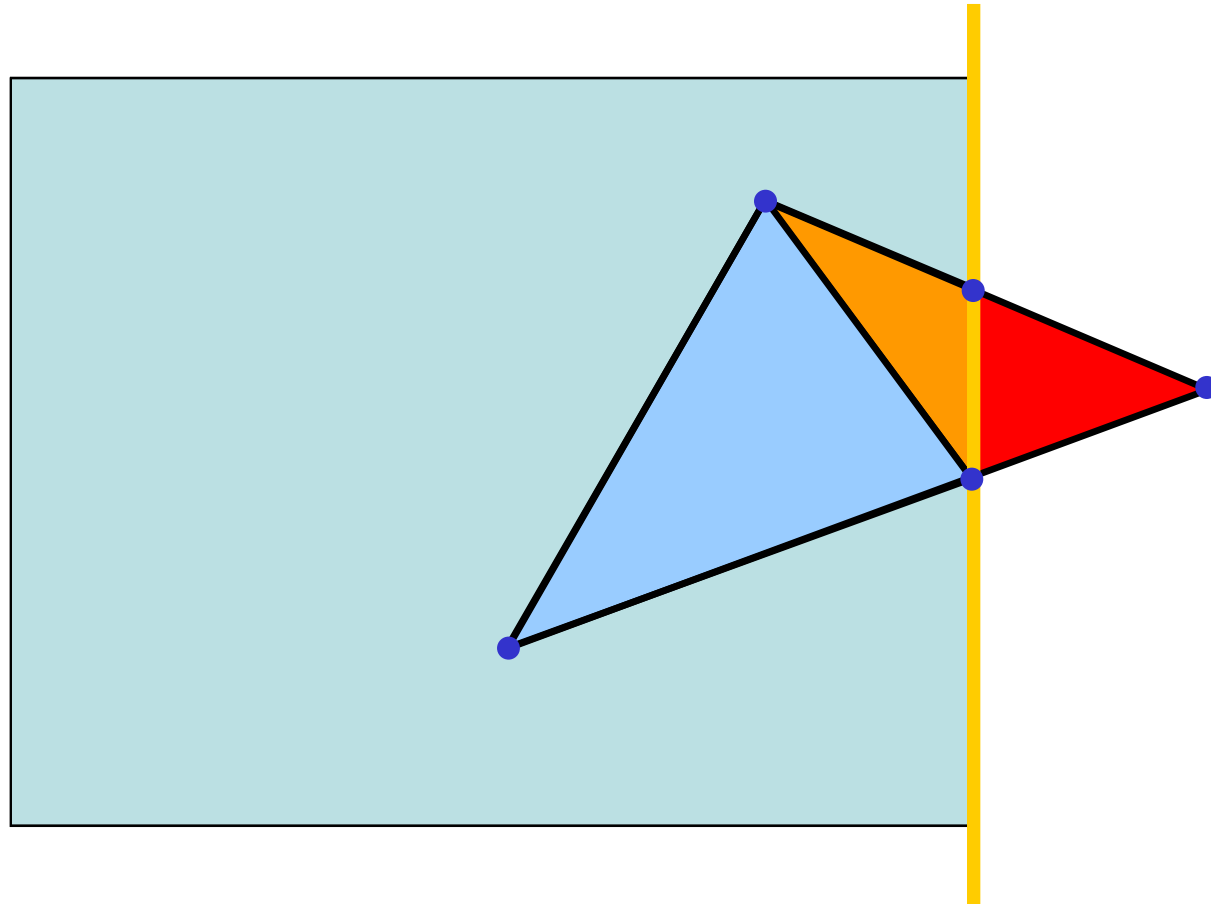
Triangle Clipping Algorithm



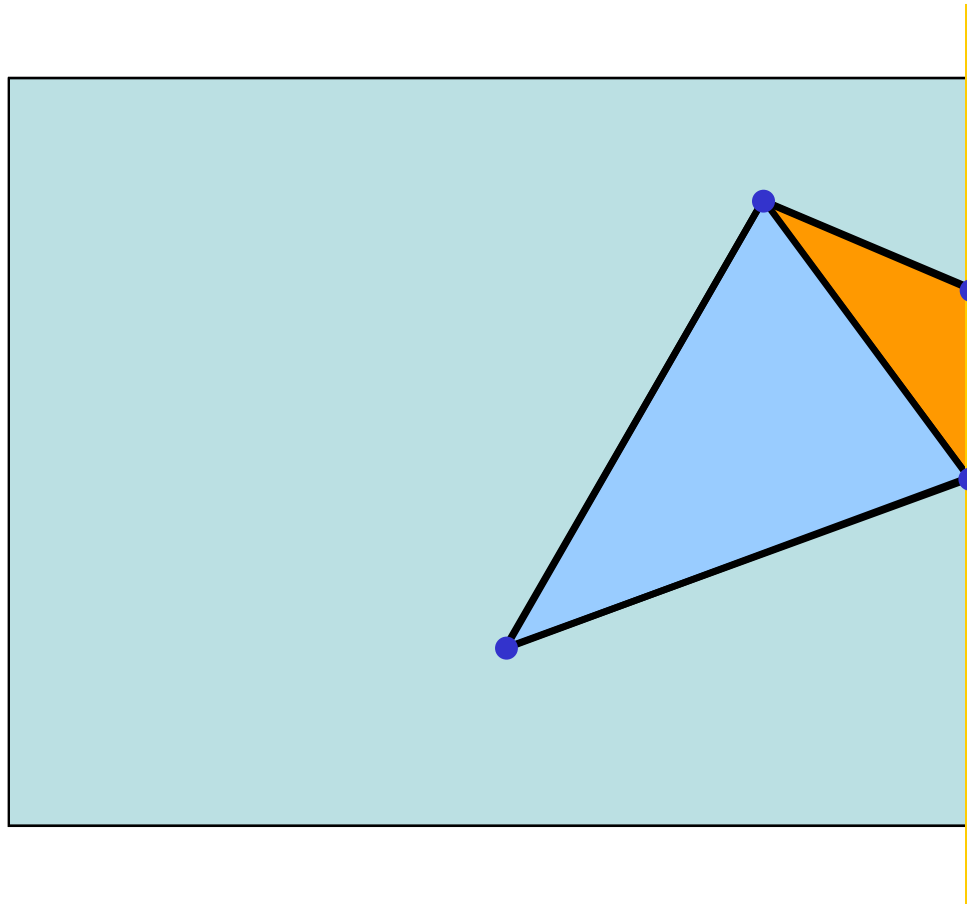
Triangle Clipping Algorithm



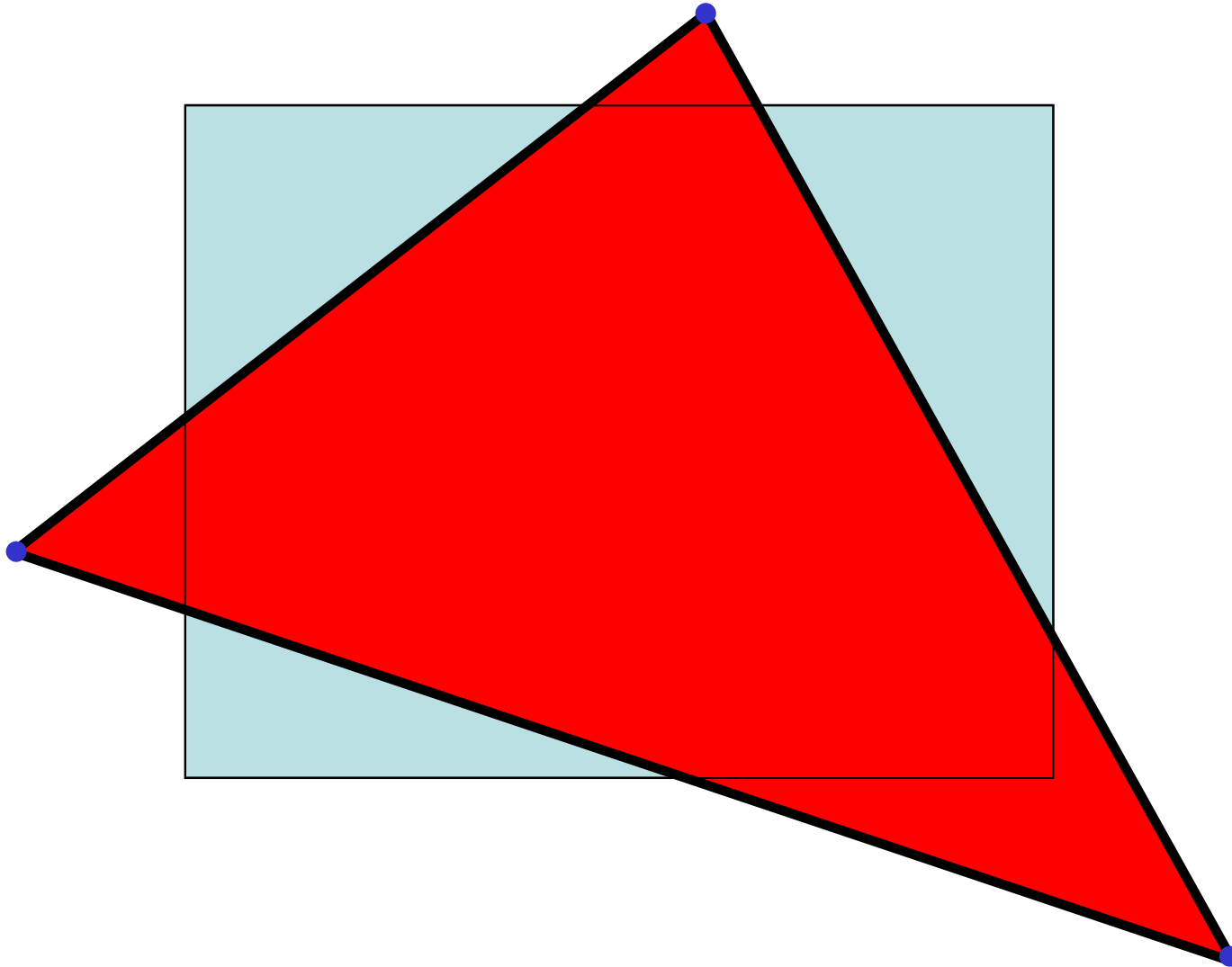
Triangle Clipping Algorithm



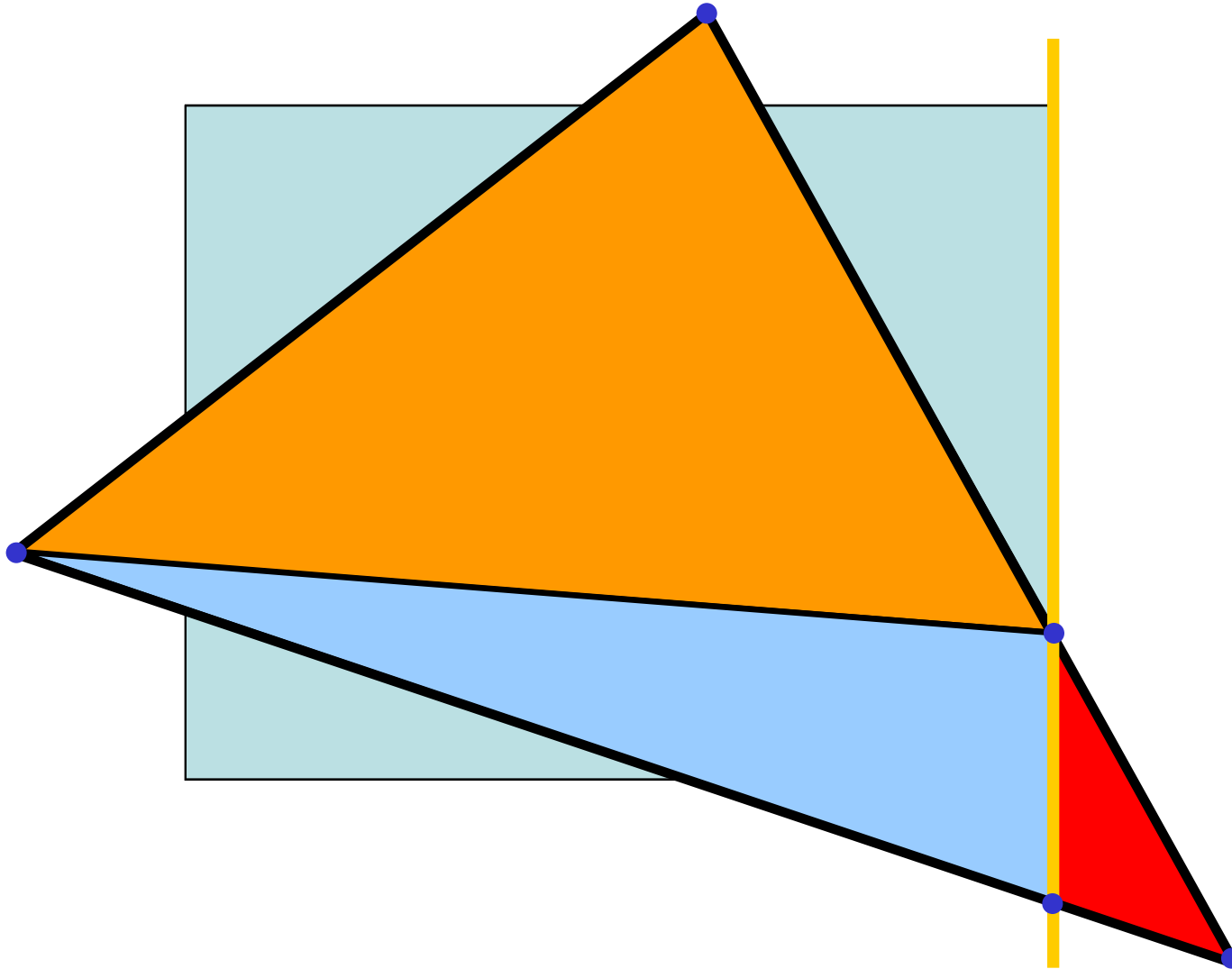
Triangle Clipping Algorithm



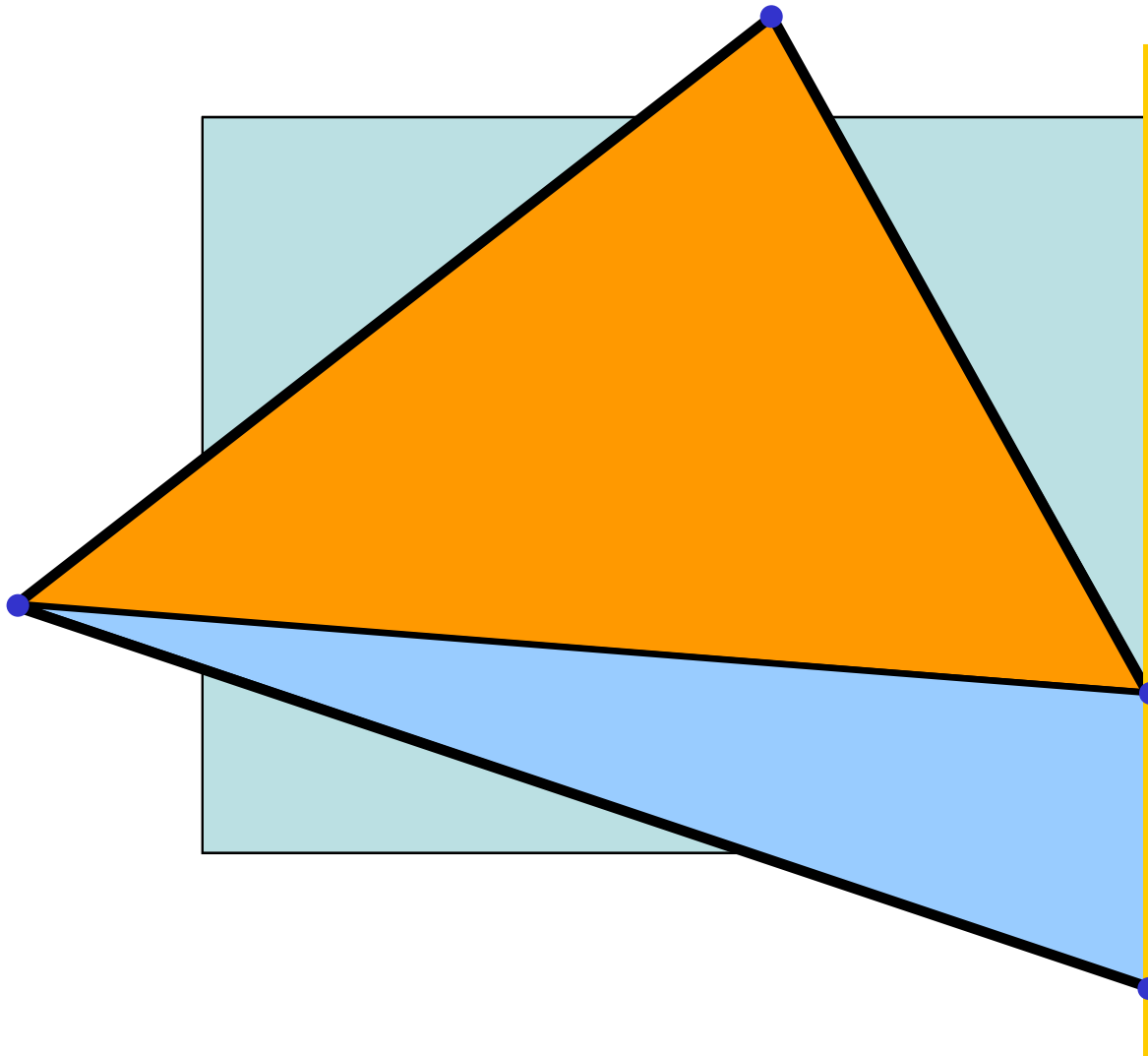
Triangle Clipping Algorithm



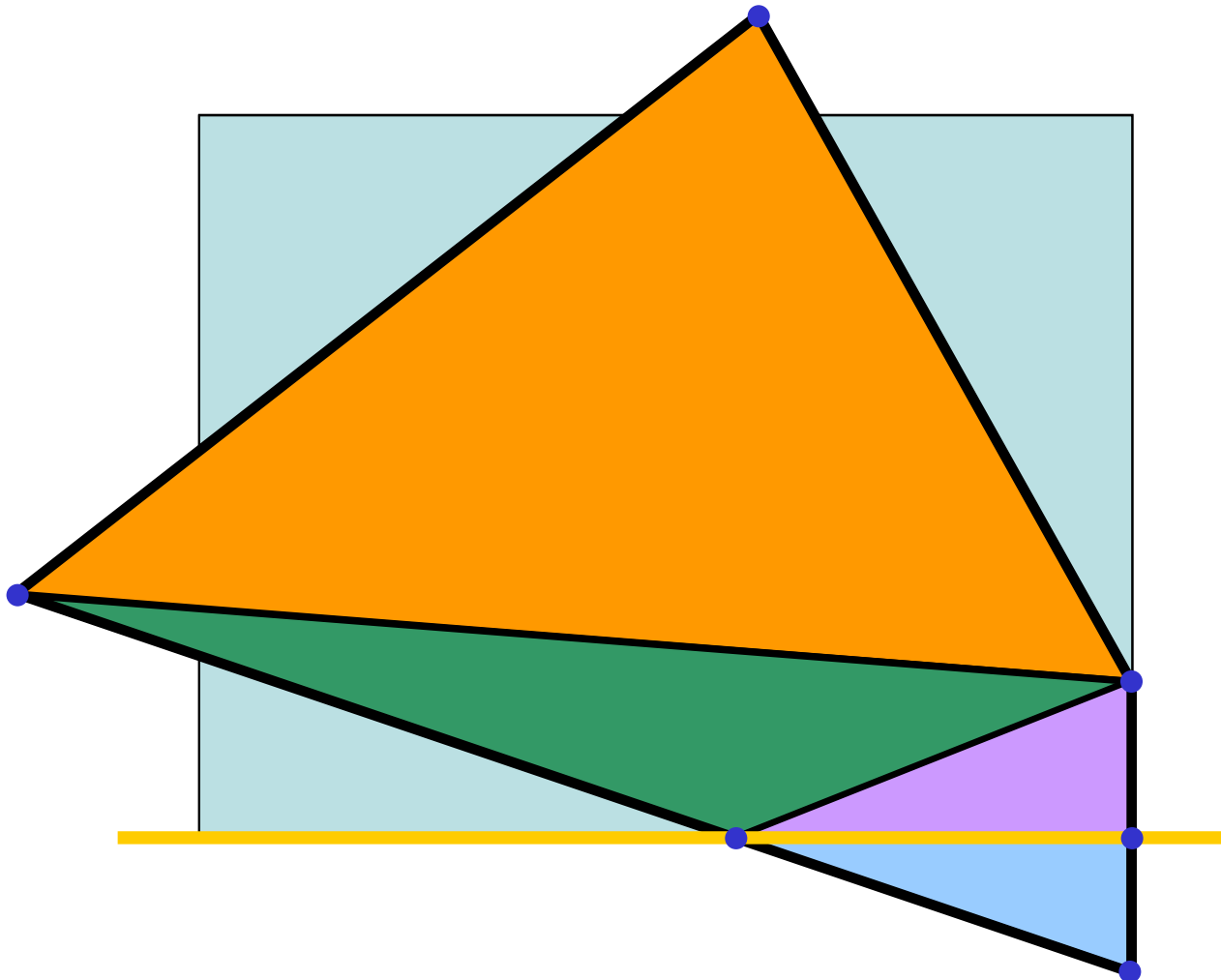
Triangle Clipping Algorithm



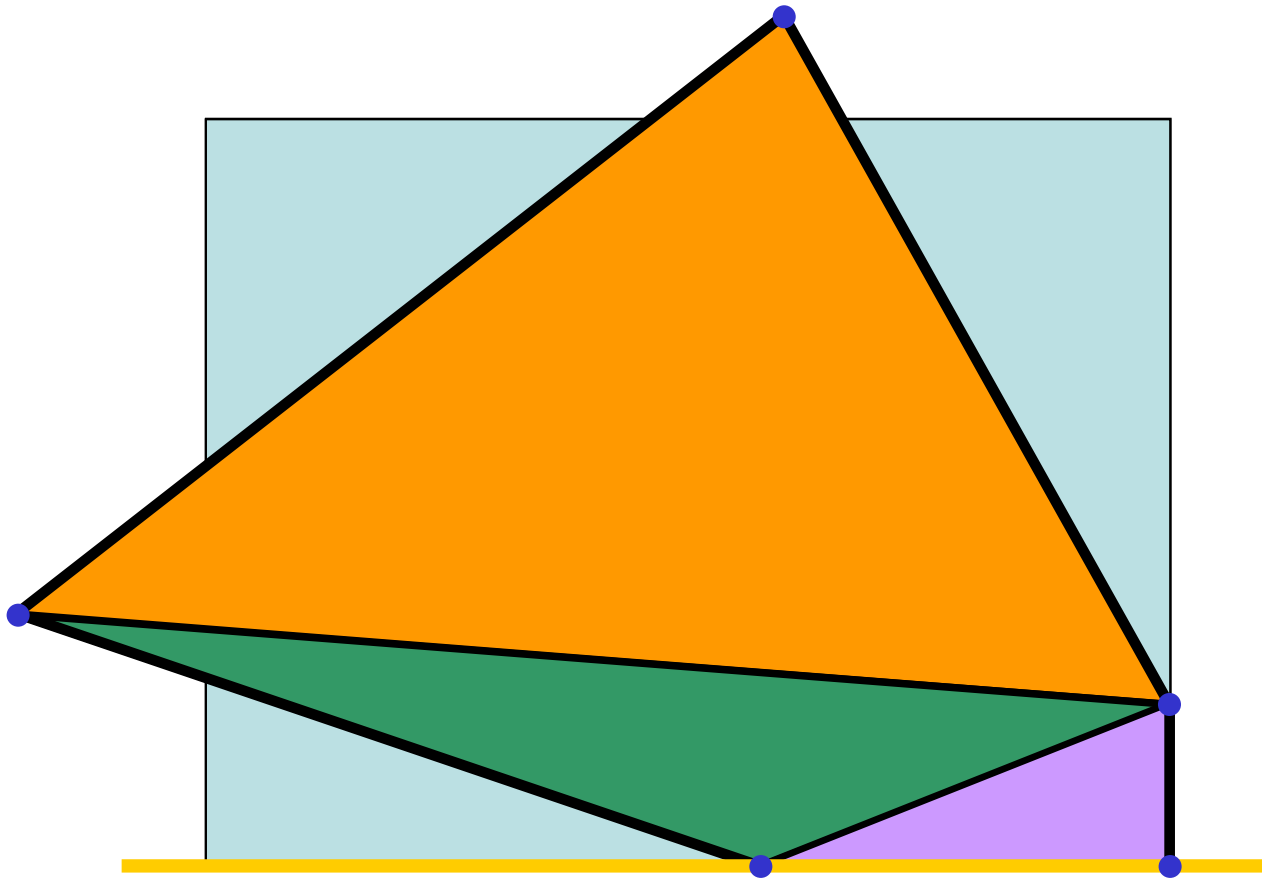
Triangle Clipping Algorithm



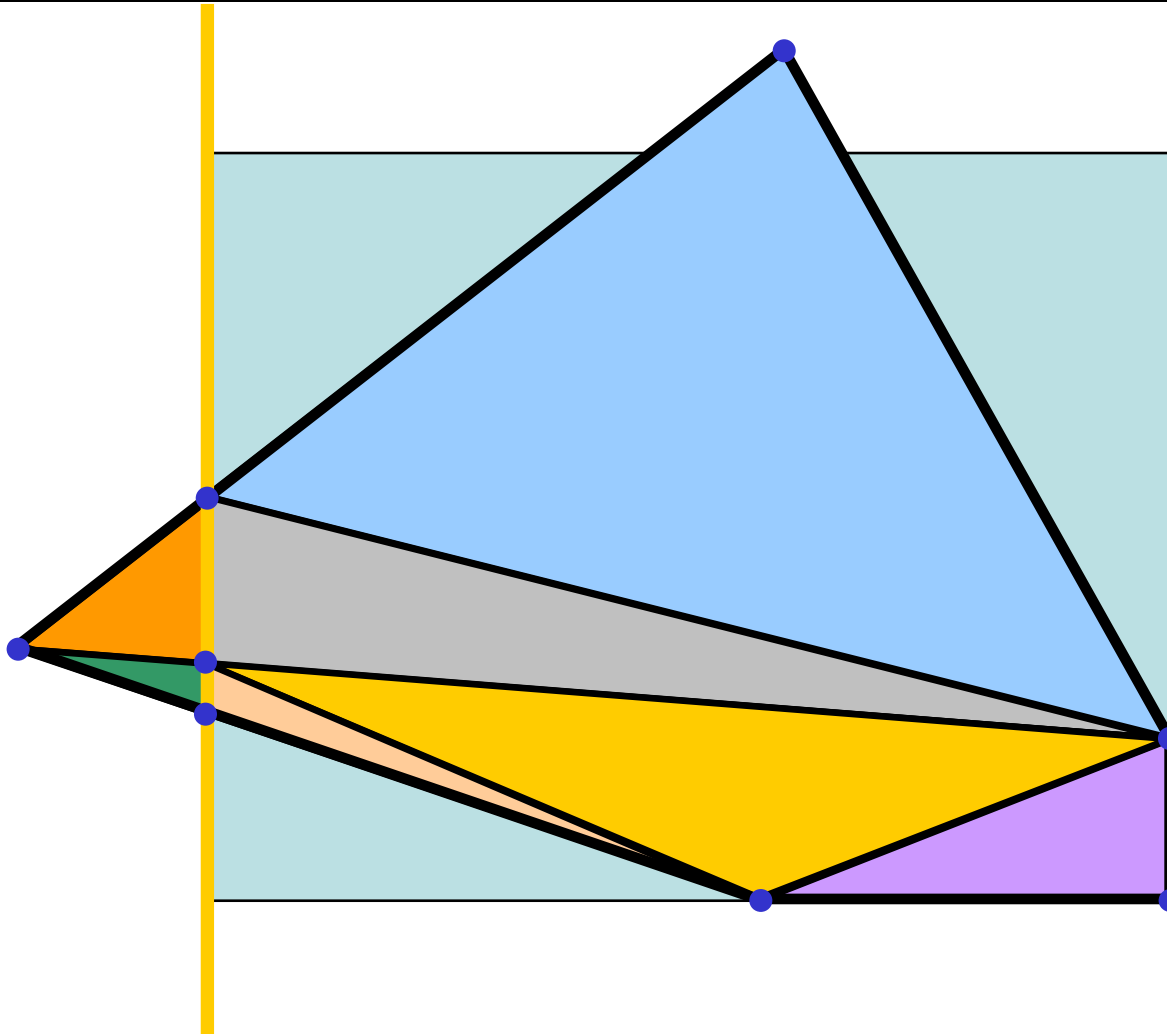
Triangle Clipping Algorithm



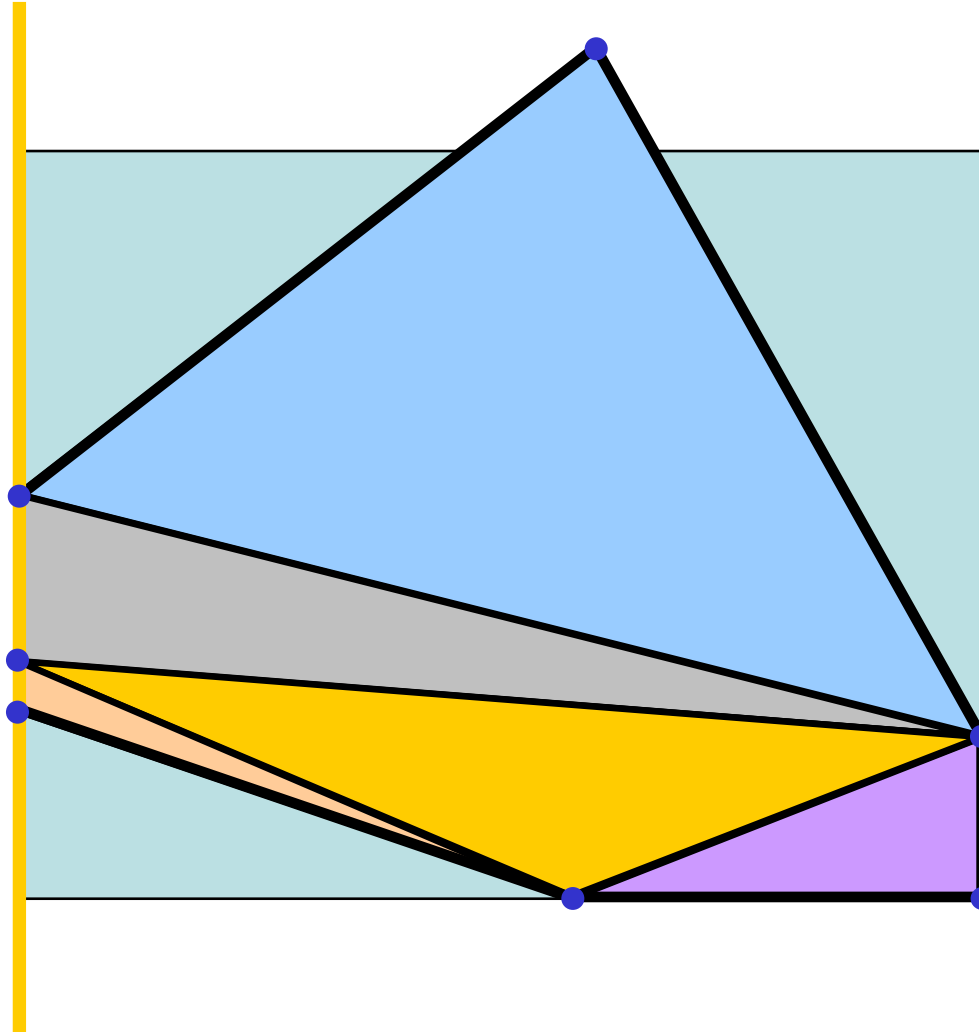
Triangle Clipping Algorithm



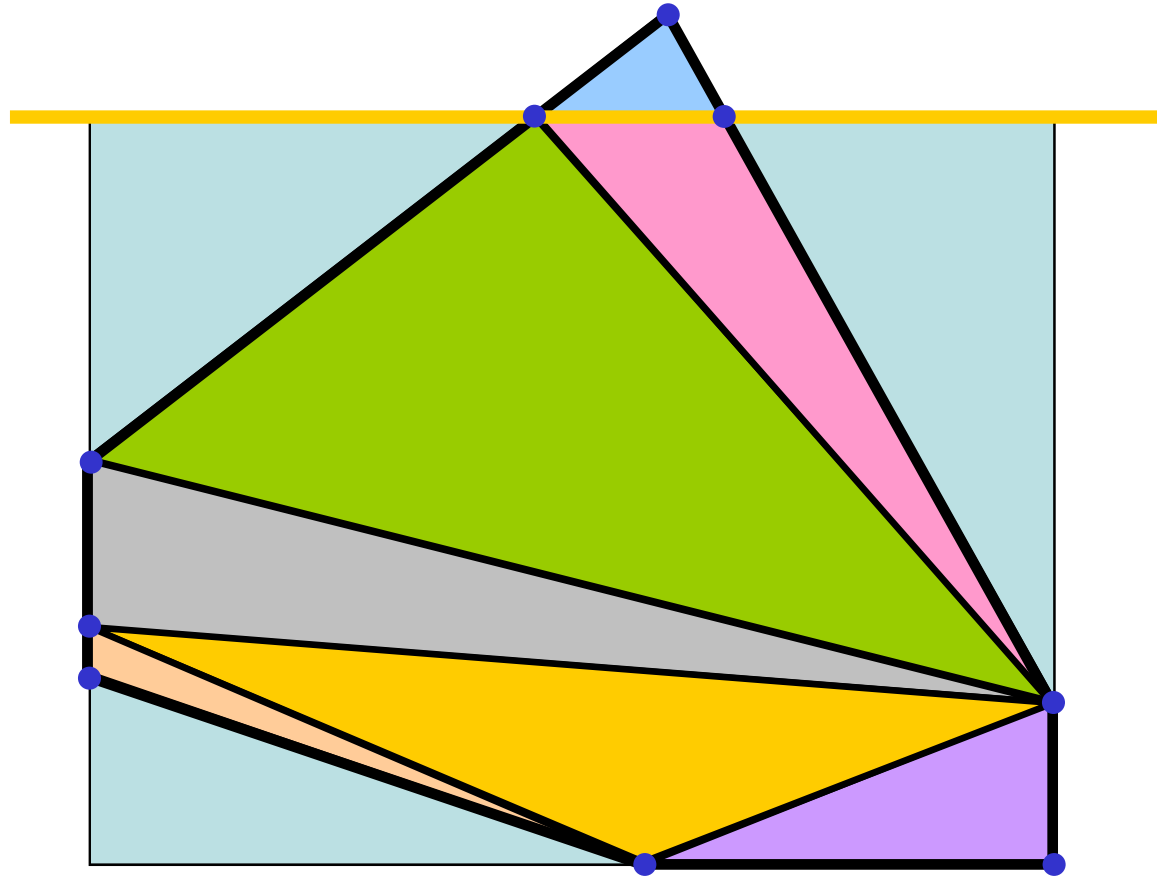
Triangle Clipping Algorithm



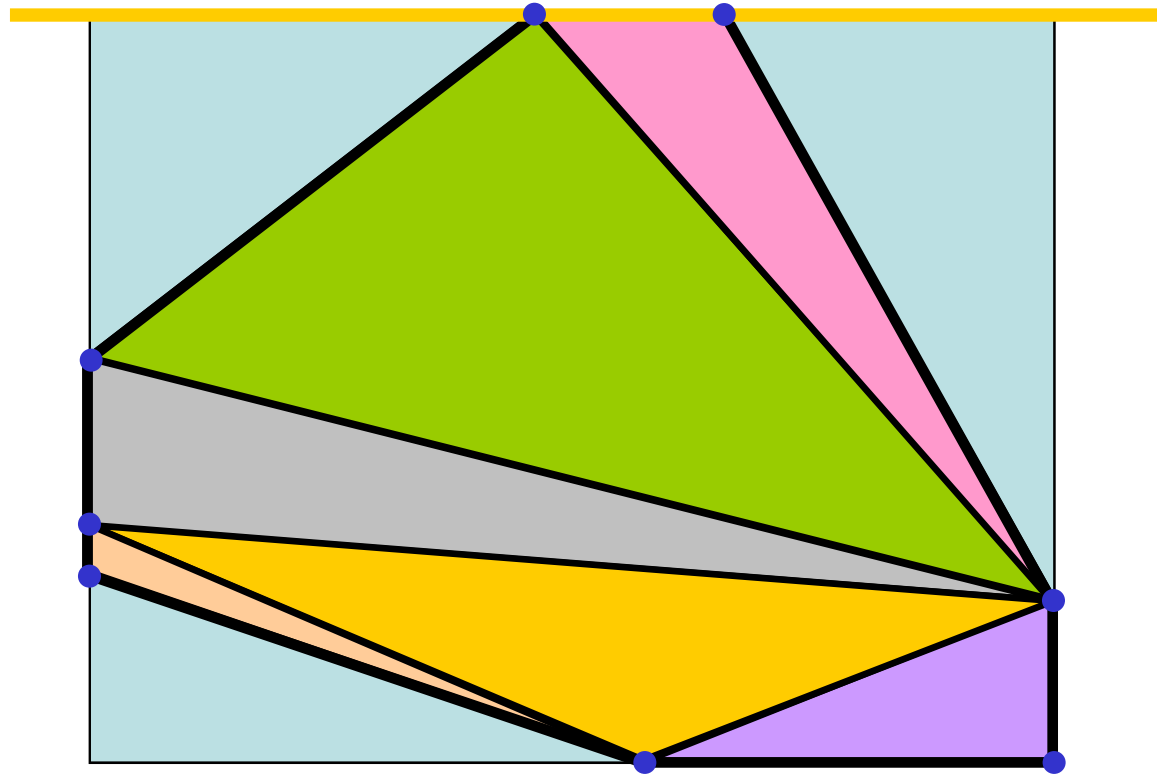
Triangle Clipping Algorithm



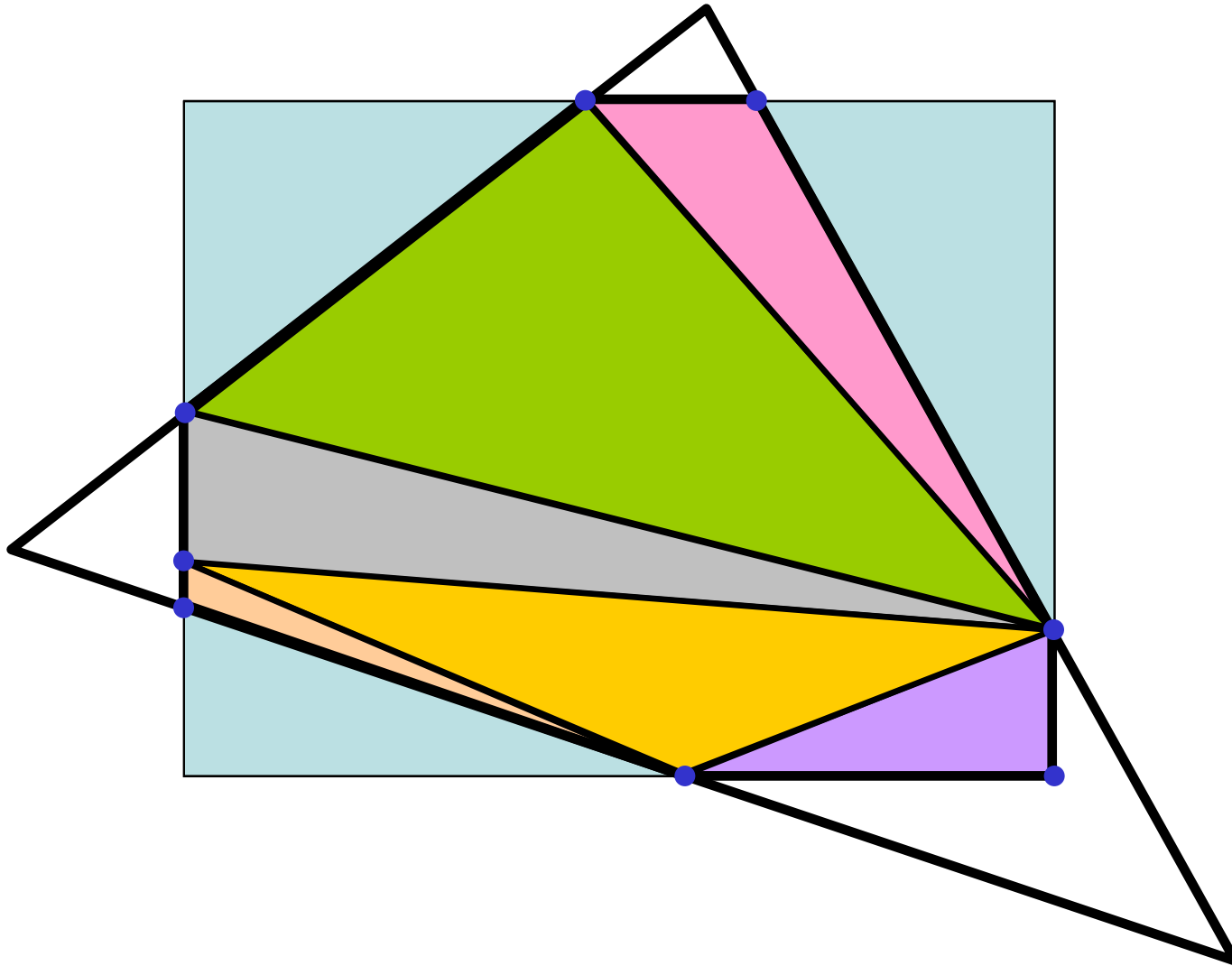
Triangle Clipping Algorithm



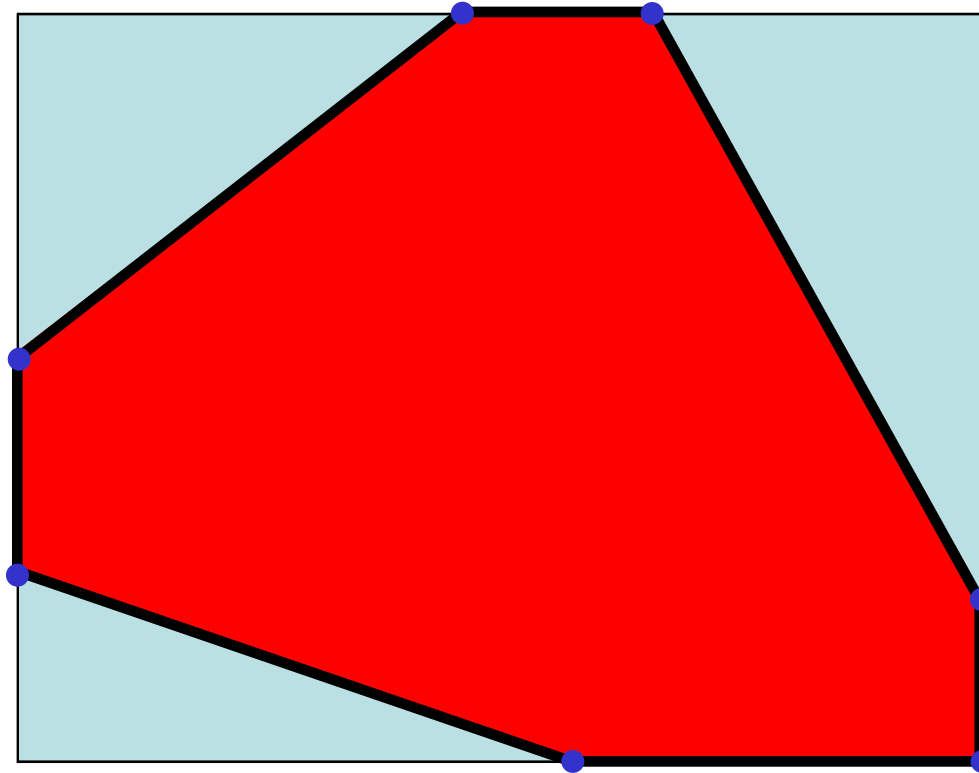
Triangle Clipping Algorithm



Triangle Clipping Algorithm



Triangle Clipping Algorithm



Viewport transformation

- Take vertices that are -1 to 1 and map them to 0 to *screen width* and 0 to *screen height* for x and y respectively

Coordinate spaces

