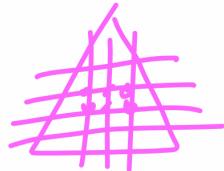


Rasterizing

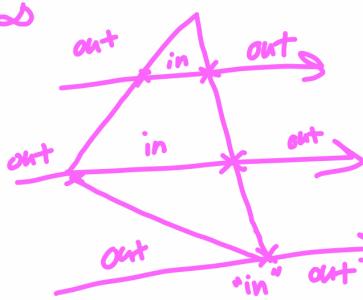
goal:

"Fill interior of polygon"



principle

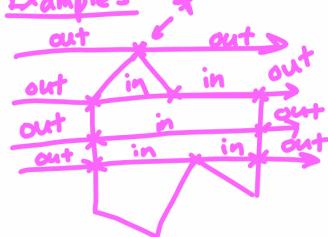
→



special:

"ray intersects vertices of polygon"

Examples



2 special cases

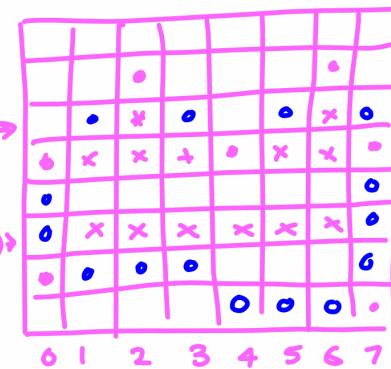
i) horizontal edge:

ii) "local max/min cases": \nearrow, \searrow

edge list
 \downarrow

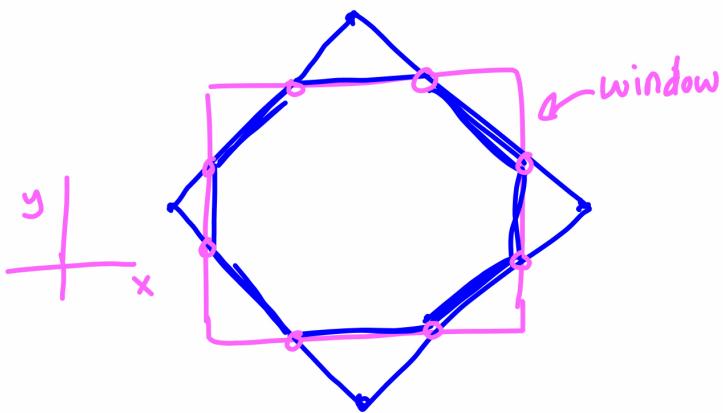
$(1,3) \Rightarrow (5,7)$

$(0,7) \Rightarrow$

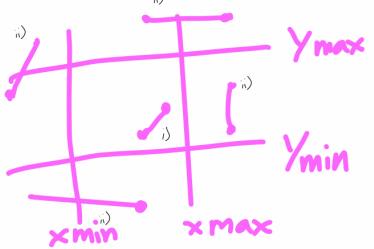


Clipping - "Cohen-Sutherland"

goal: "clip geometry against 'window'"



geometry



i) both vertices inside window, ie,

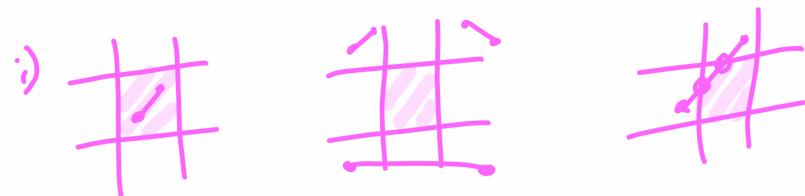
$$\begin{aligned}x_{\min} \leq \text{vertex}.x &\leq x_{\max} \\y_{\min} \leq \text{vertex}.y &\leq y_{\max}\end{aligned}$$

ii) both vertices are
 - to left of
 - to the right of
 - above, or
 - below

Basic step: clip single edge

→ Bases:

- i) edge entirely inside
- ii) " " outside
- iii) " " partially inside, " outside



fails P_1, P_2

$$P_L = (x_{\min}, y_{\min} + b)$$

≥ new lines: $\overline{P_1 P_L}$ & $\overline{P_2 P_L}$

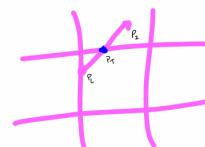
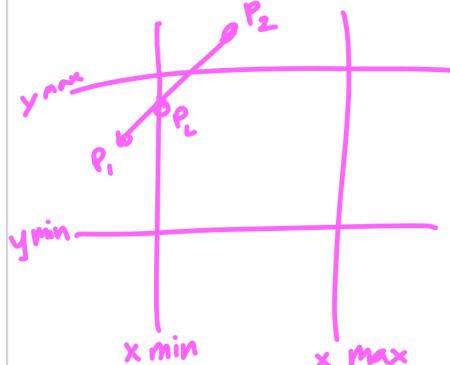
⇒ check $\overline{P_1 P_L} \Rightarrow$ outside → rej

⇒ check $\overline{P_2 P_L} \Rightarrow$ fails i & ii

⇒ check ≥ new lines

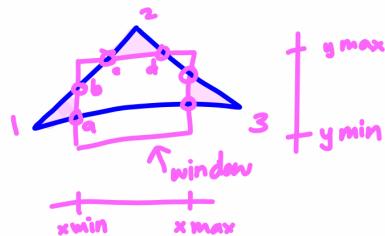
$\overline{P_1 P_L}$: inside ✓

$\overline{P_2 P_L}$: outside ✓



clipping - Sutherland - Hodgeman

Example:



original : 1, 2, 3

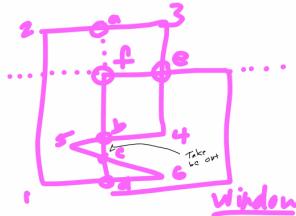
x_{min}-clip : b, 2, 3, a

y_{min}-clip : b, c, d, 3, a

x_{max}-clip : b, c, d, e, f, a

y_{max}-clip : b, c, d, e, f, a done

Example



orig : 1, 2, 3, 4, 5, 6, 7, 8

x_{min} : a, 3, 4, b, c, a, 6

y_{max} : e, 4, b, c, 6, d

x_{max} : no change

y_{max} : 11