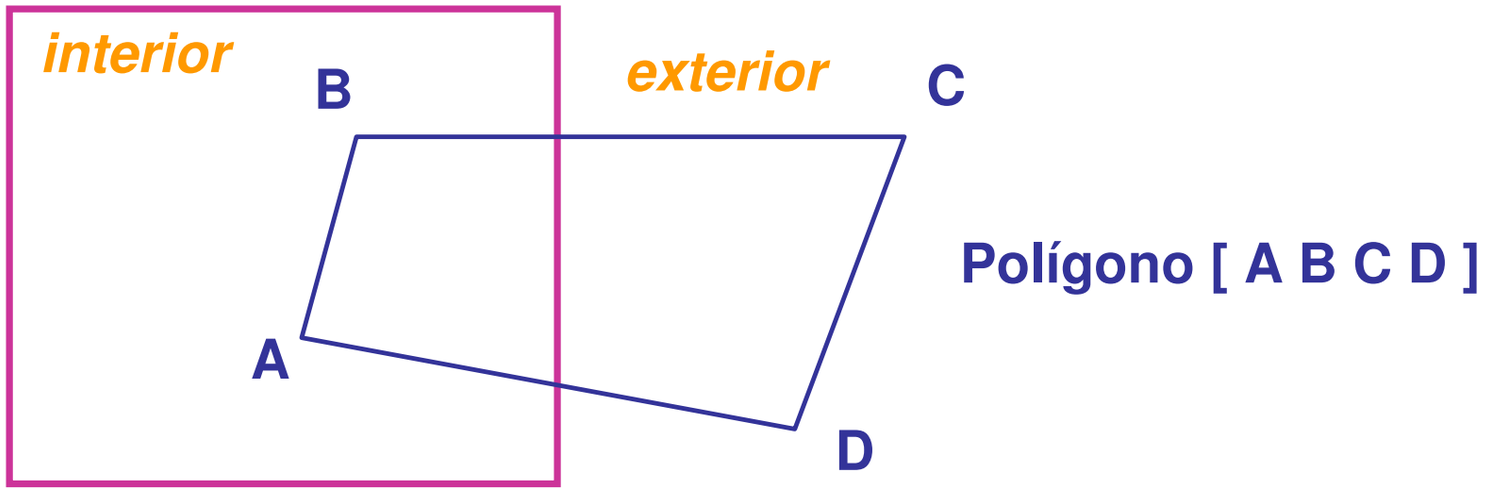
Recorte

Polígonos

Recorte de Polígonos

RECORTE de POLÍGONOS por janelas retangulares

Algoritmo de Sutherland-Hodgman *



Inicializações:

V_i = Lista dos vértices de entrada = [A B C D]

V_o = Lista dos vértices de saída = [ ]

* Este algoritmo pode generalizar-se a qualquer janela poligonal convexa

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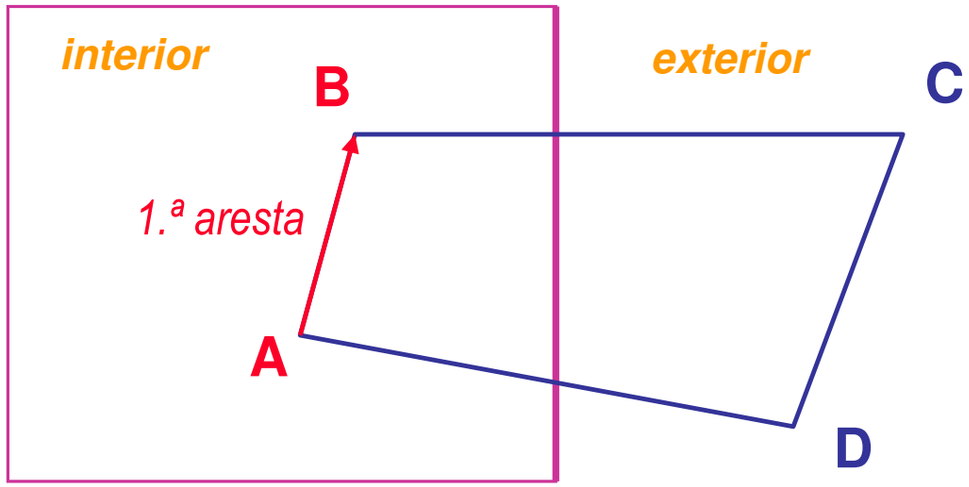
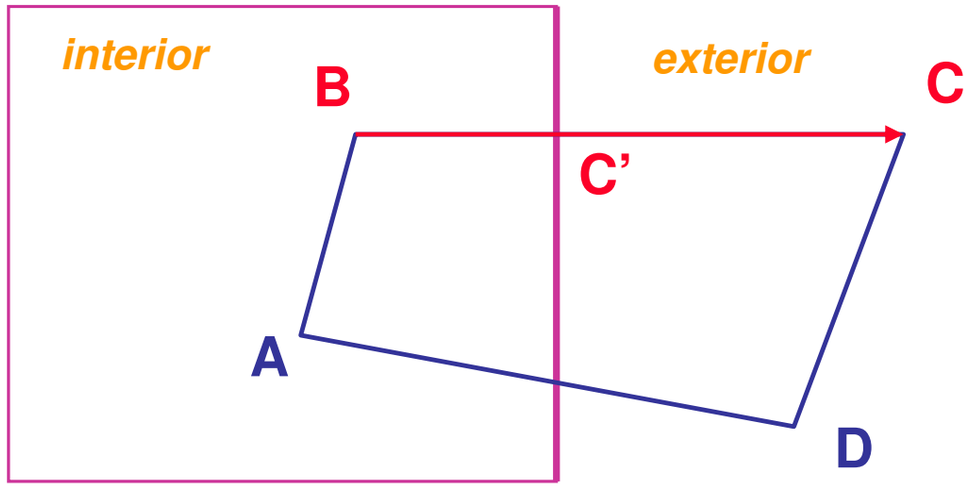
Algoritmo de Sutherland-Hodgman : as 4 regras exemplificadas



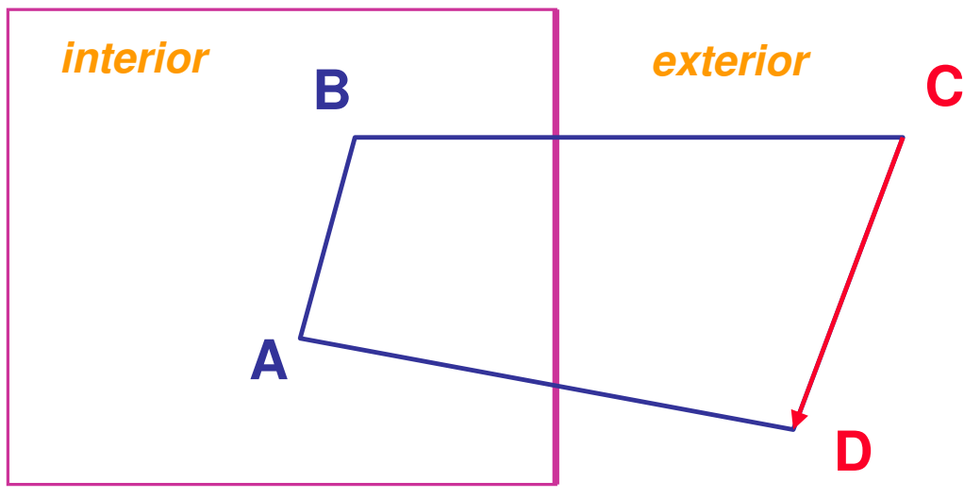
A e B no interior ⇒ juntar B a V_o

V_o = [B]



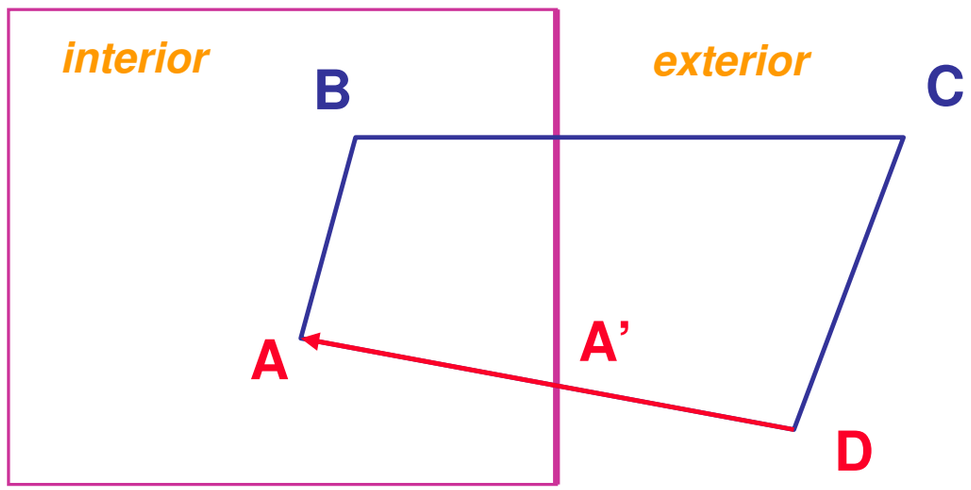
B interior e C exterior ⇒ calcular e juntar C'

V_o = [B C']



C e D no exterior ⇒ continuar

V_o = [B C']



D exterior e A interior ⇒ calcular A' e juntar A' e A

V_o = [B C' A' A]

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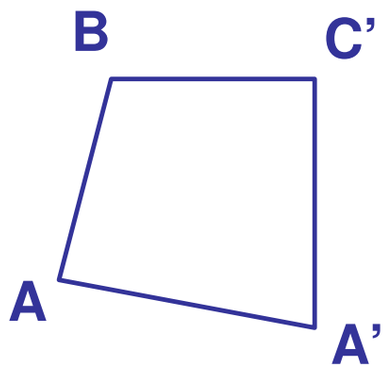
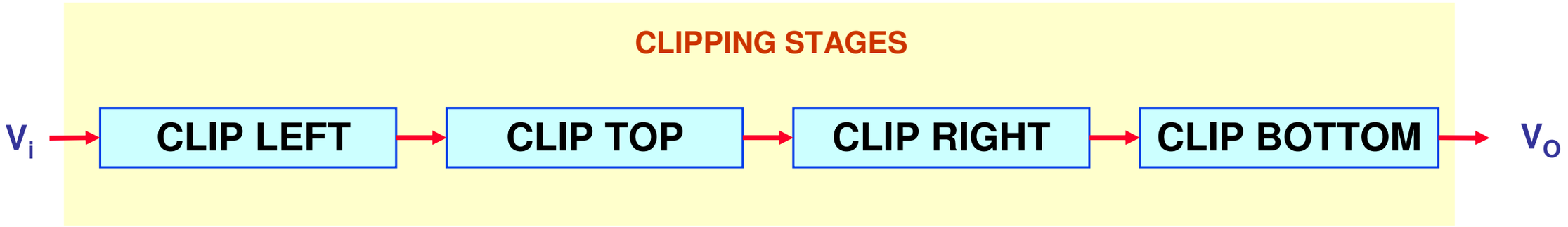
Algoritmo de Sutherland-Hodgman

O polígono [A B C D] atrás exemplificado foi transformado em [B C' A' A] pela operação de recorte:



Para um polígono arbitrário, o algoritmo aplica-se por fases sequenciais:



Nota: A ordem destas fases pode ser definida arbitrariamente!

Questão: Como se poderia generalizar este algoritmo aos casos de janelas (convexas) não retangulares?

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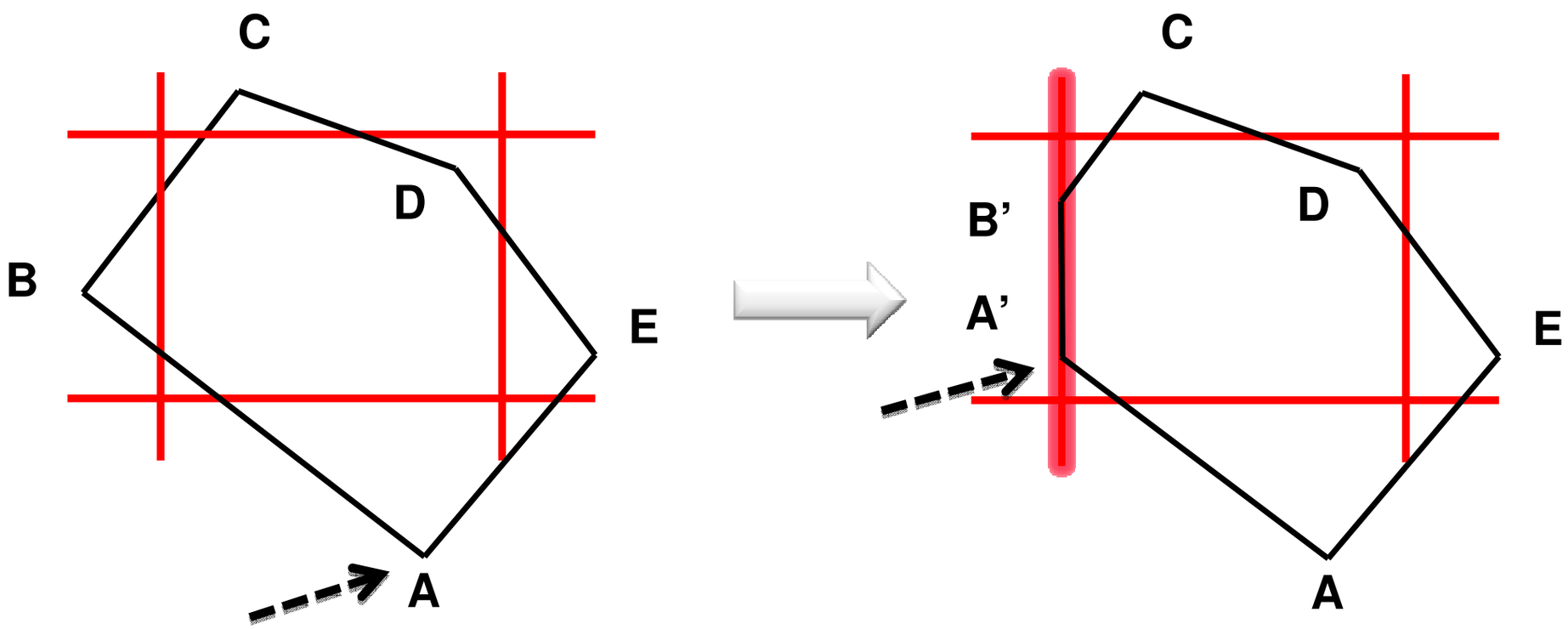
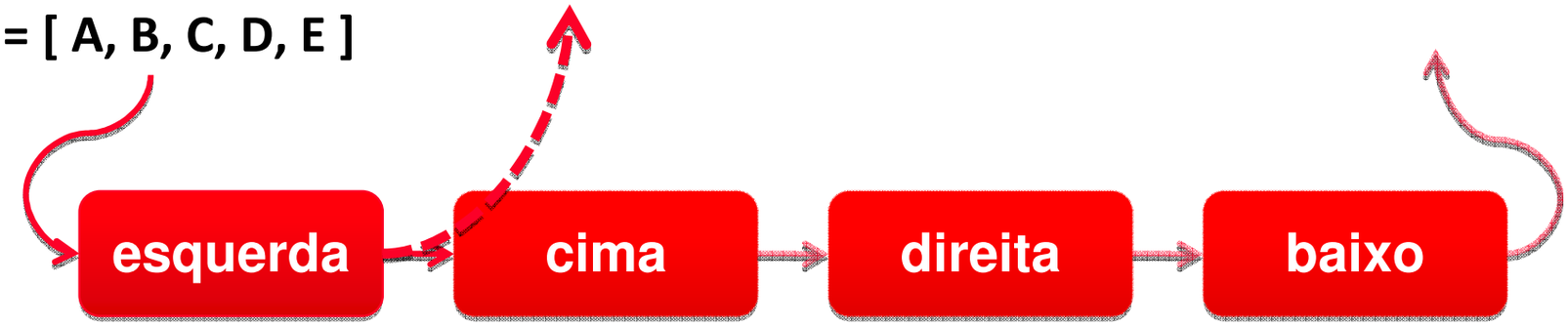
Exemplo



~~$Vo_1 = [A, A', B', C, D, E]$~~

$Vo_1 = [A', B', C, D, E, A]$

$Vi = [A, B, C, D, E]$



Autor: Adriano Lopes

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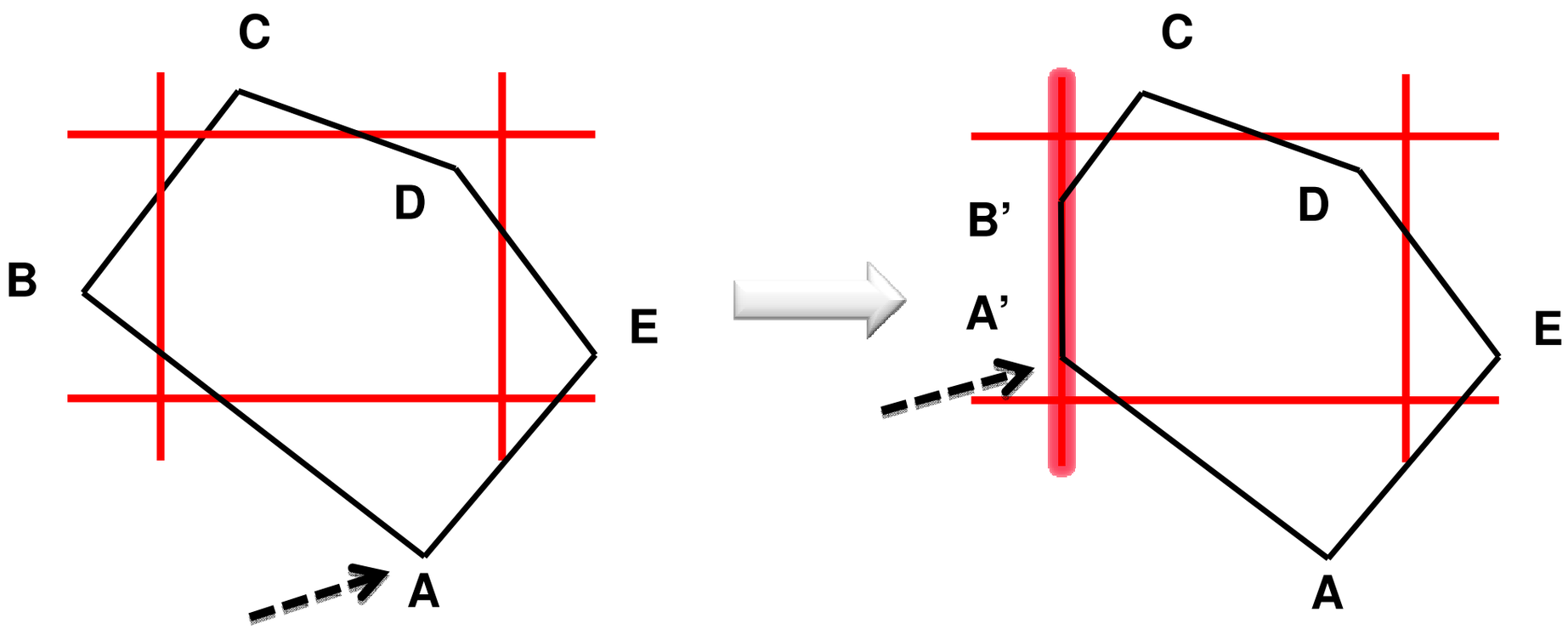
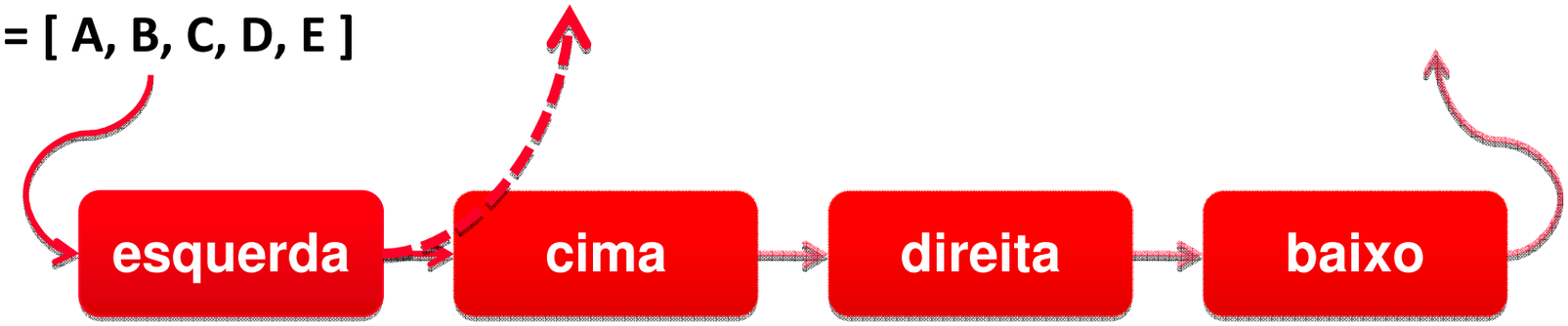
Exemplo



~~$Vo_1 = [A, A', B', C, D, E]$~~

$Vo_1 = [A', B', C, D, E, A]$

$Vi = [A, B, C, D, E]$



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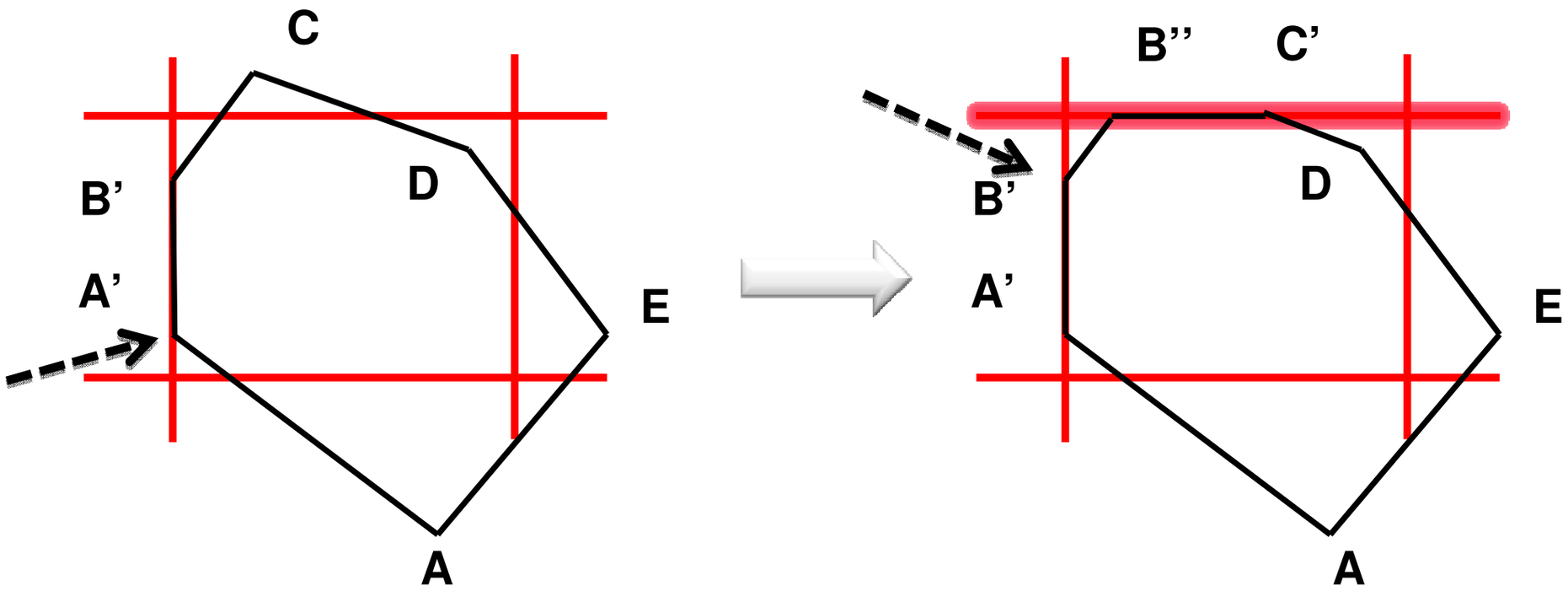

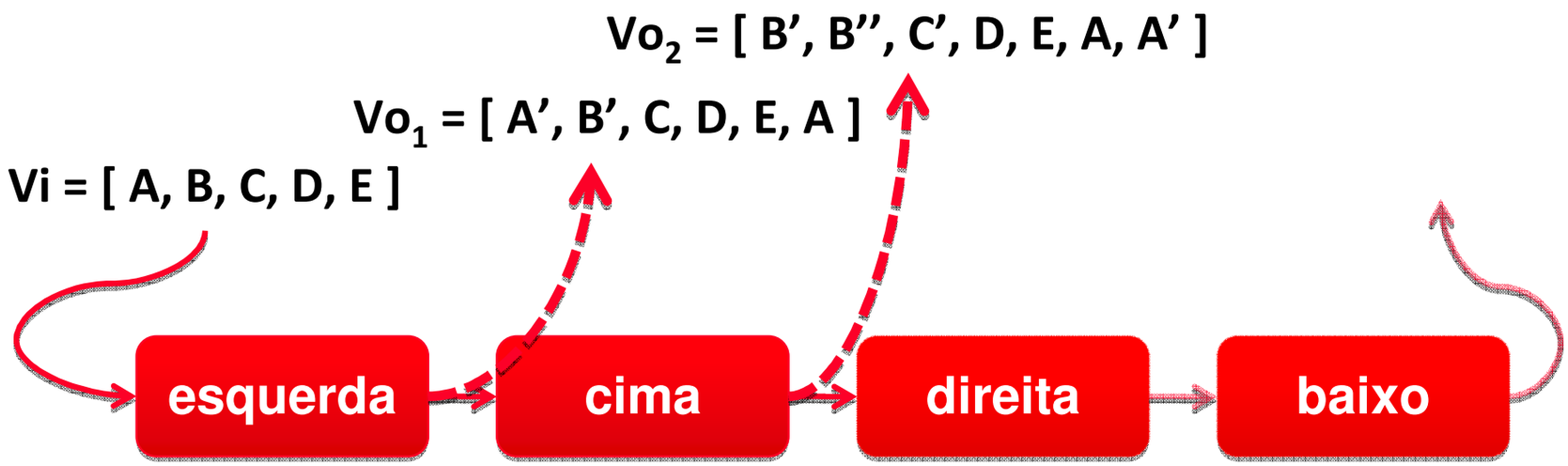

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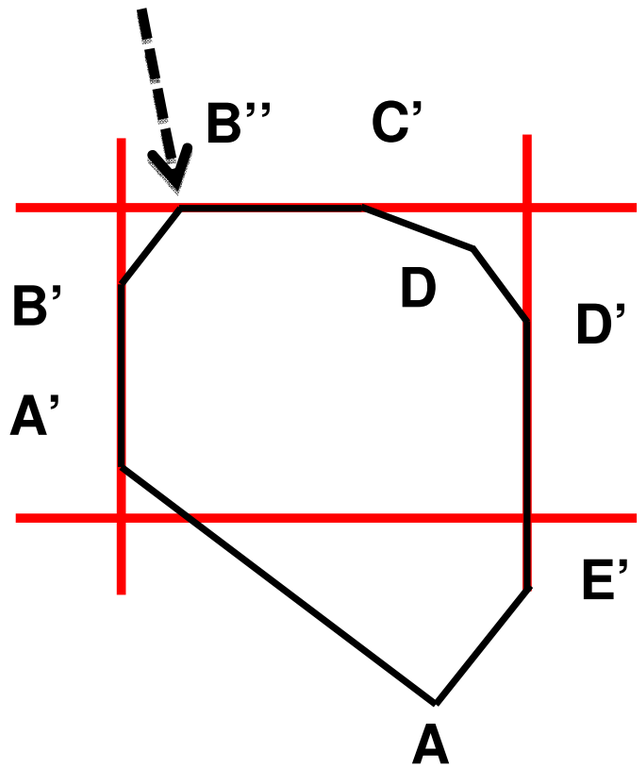

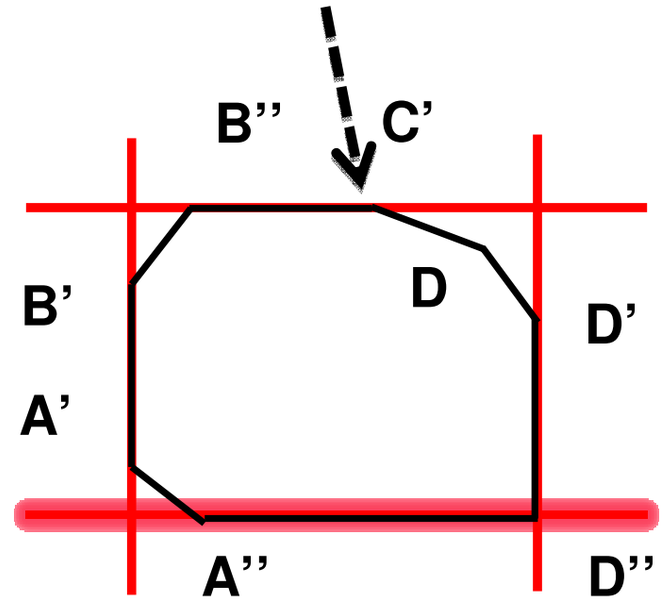

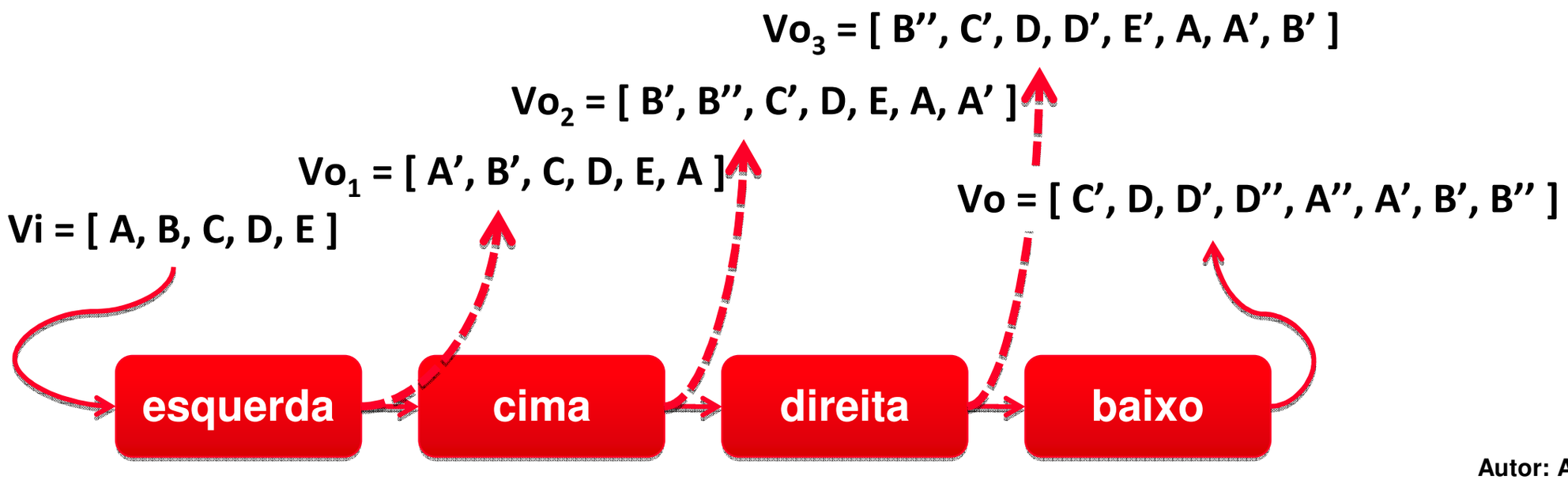

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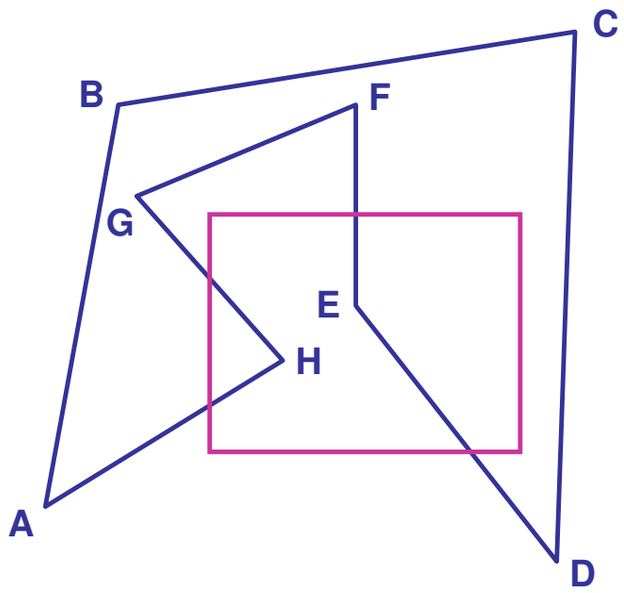
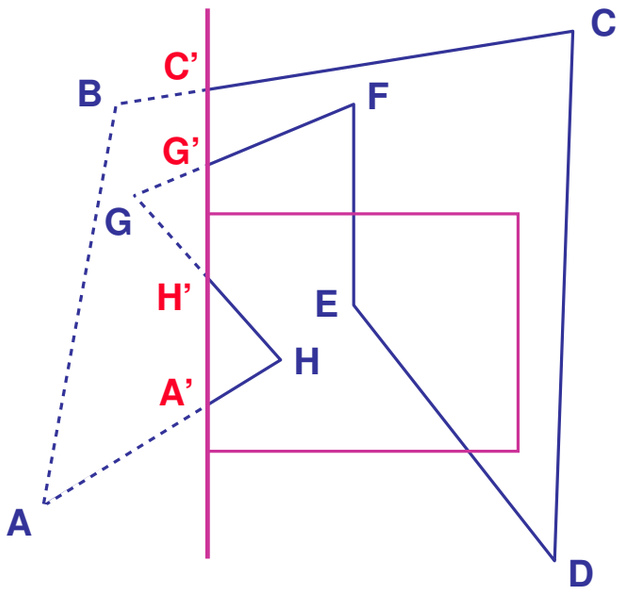
Algoritmo de Sutherland-Hodgman - EXEMPLO MAIS COMPLEXO *(Polígono não convexo)* :

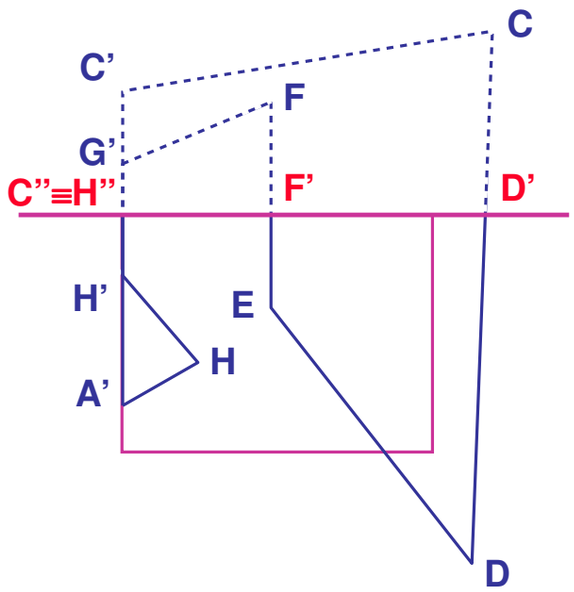
Os nomes dos novos nós são perfeitamente convencionais



V_i = [A B C D E F G H]



V_{O1} = [C' C D E F G' H' H A'] = V_{i2} →



V_{O2} = [D' D E F' H'' H' H A' C''] = V_{i3} →

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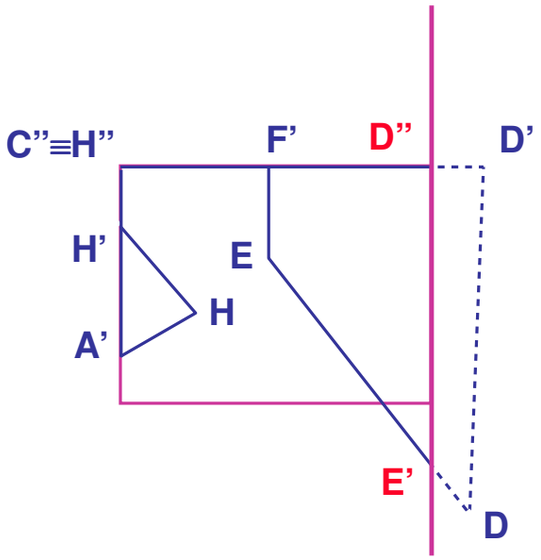
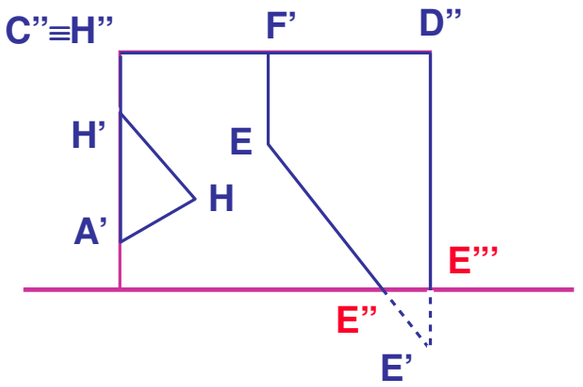
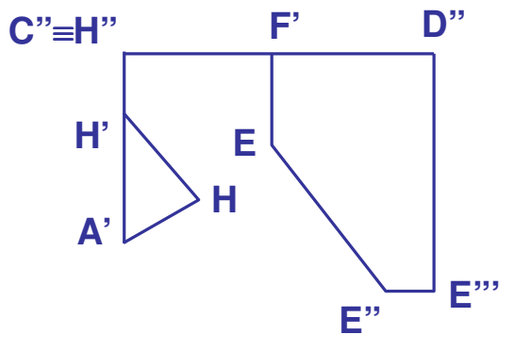
Algoritmo de Sutherland-Hodgman - *(conclusão)*





→ $V_{O3} = [\ E'\ E\ F'\ H''\ H'\ H\ A'\ C''\ D''\ ] = V_{i4}$ → $V_{O4} = [\ E''\ E\ F'\ H''\ H'\ H\ A'\ C''\ D''\ E'''\ ] = V_o$

Polígono recortado:



Exercício proposto: aplicar o algoritmo de FILL AREA ao resultado.

O algoritmo de Sutherland-Hodgman pode gerar <u>arestas estranhas</u> (como F'H'' ou H''H') aos polígonos não convexos, com possibilidade de serem eliminadas apenas em pós-processamento. No entanto, não haverá problemas desse género se se recortar um qualquer polígono convexo.

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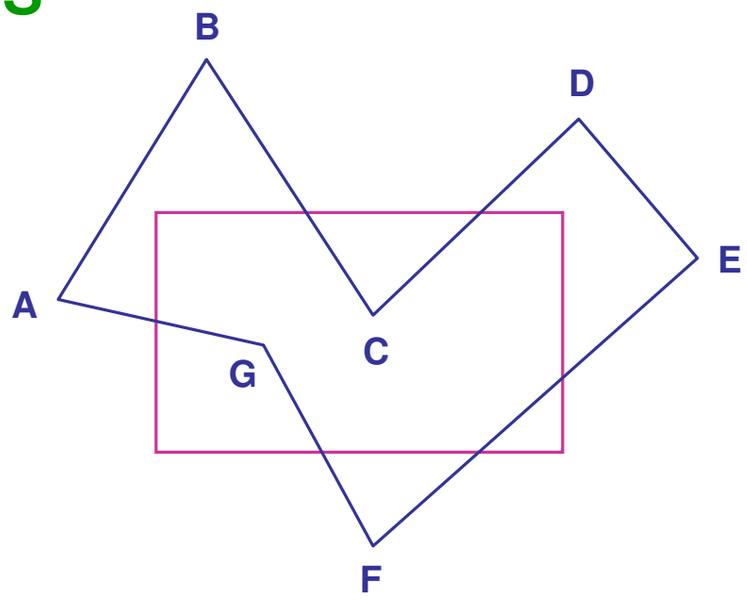
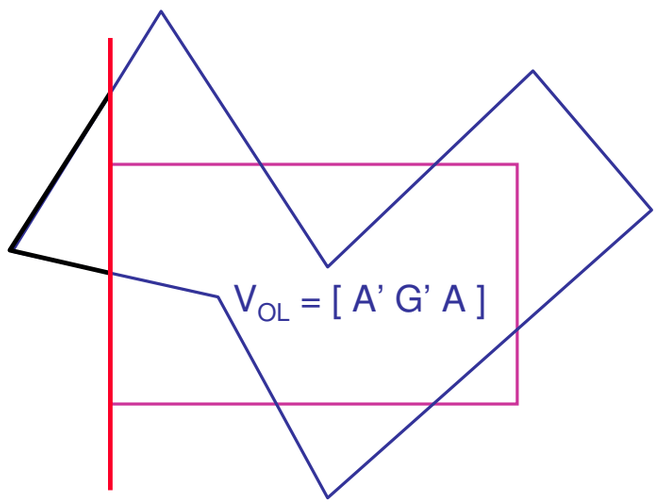
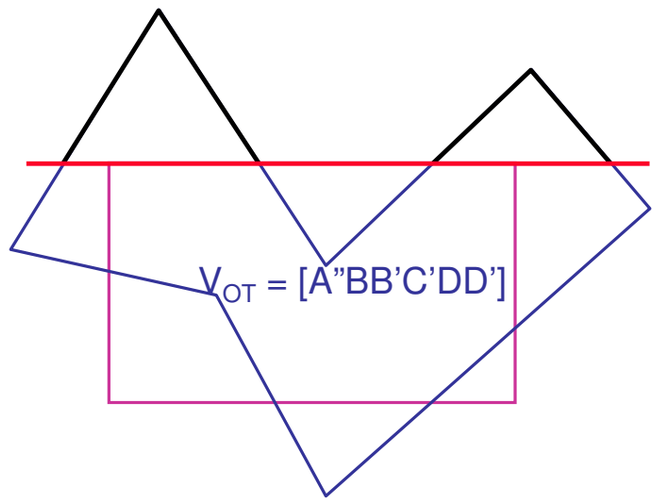
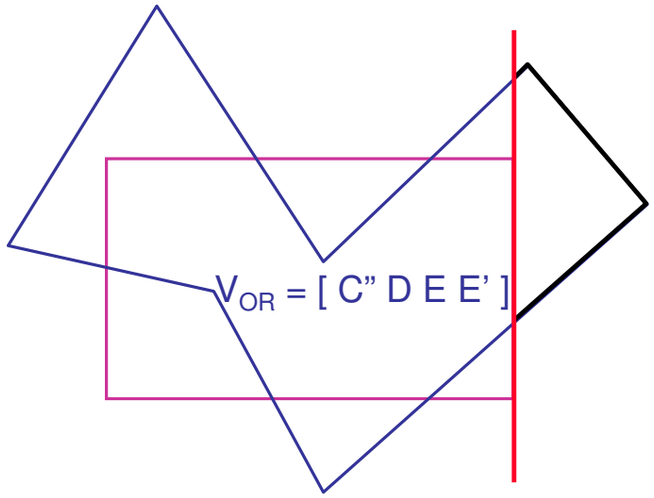
RECORTE de POLÍGONOS

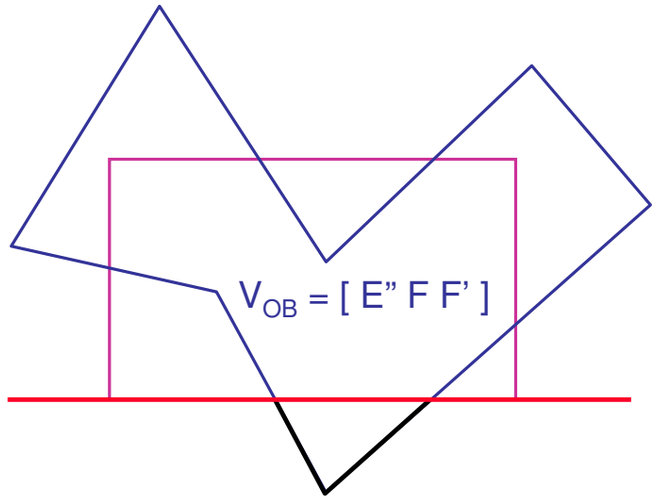
Variante: RECORTE EXTERIOR (SHIELDING *or* BLANKING)











$V_O = \{ V_{OL}, V_{OT}, V_{OR}, V_{OB} \}$

Resultado final da aplicação de FILL AREA a V_O
(as sobreposições não são evitadas!)

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