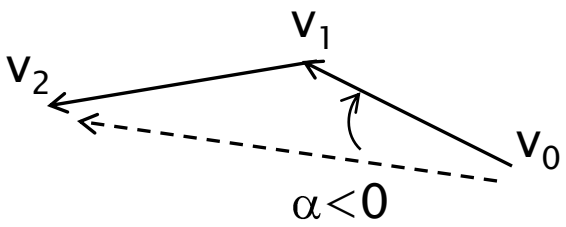
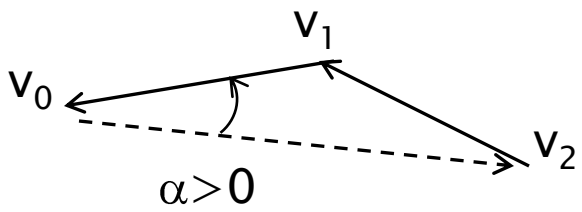
Triangulation of (x-)monotone polygon

TriangulateMonotonePolygon(MP)
Input : an x-montone polygon MP
Output : a triangulation of MP
{
Fuse the vertices of the superior and inferior chain into a common structure. The vertices are classified in a lexicographic order, t_0 is the first (leftmost) and, t_{n-1} the last one.
Initialize an empty stack S , and push t_0 and t_1
For j from 2 to n-2
{
If t_j and the 1st vertex on the stack are on different chains
{
Pop all the vertices from the stack, create a diagonal between those and the current vertex t_j, except the last on the stack.
Push t_{j-1} and t_j on the stack
}
Else
{
Pop one vertex from the stack S ;
Pop the other vertices one by one as far as one can make a diagonal (not crossings)
Push back the last pop-ed vertex, and t_j
}
}
Create diagonals between t_{n-1} and all the remaining vertices in the stack, except the first and last.
}

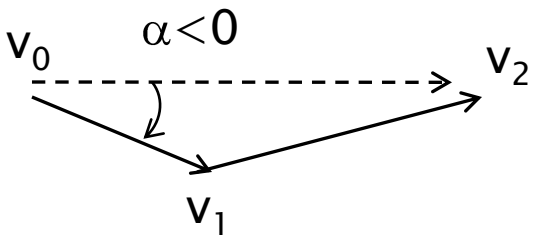
Triangulation of (x-)monotone polygon

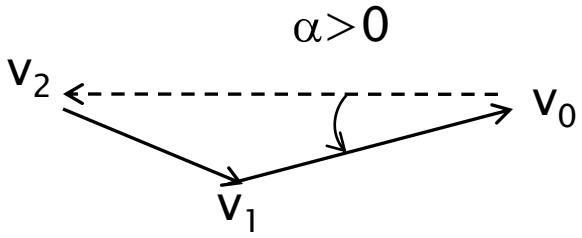
- Cheking if a diagoanal is inside a polygon, first three points: two cases:
  - Upper





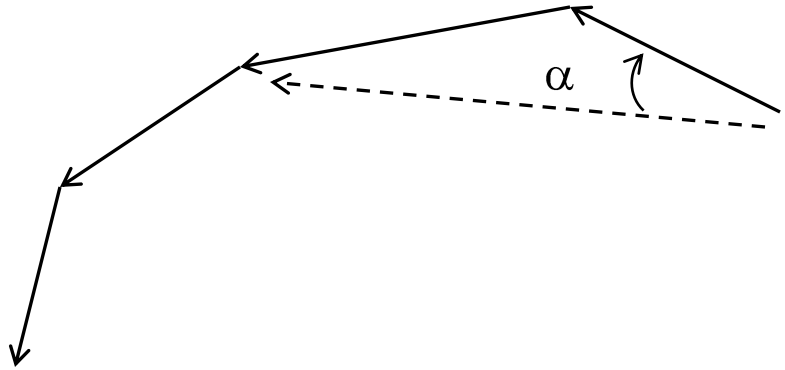
  - Lower





Triangulation of (x-)monotone polygon

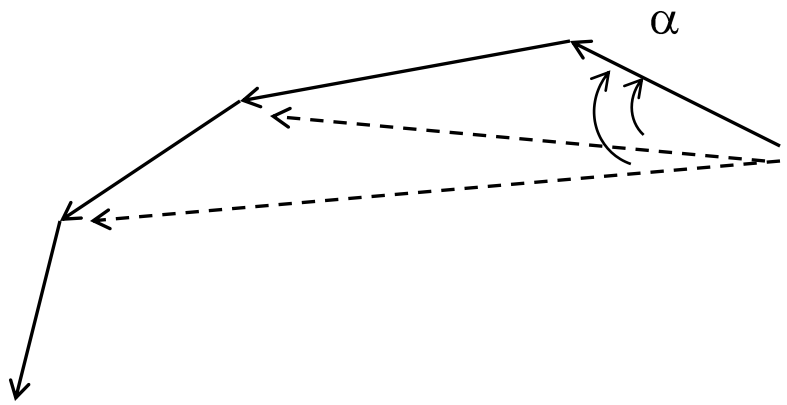
- Cheking if a diagoanal is inside a polygon, n points:



Angle α should always increase
(in absolute value)

Triangulation of (x-)monotone polygon

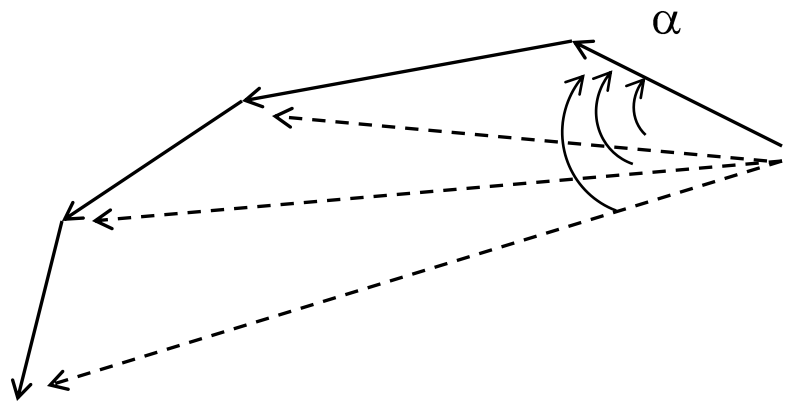
- Cheking if a diagoanal is inside a polygon, n points:



Angle α should always increase
(in absolute value)

Triangulation of (x-)monotone polygon

- Cheking if a diagoanal is inside a polygon, n points:

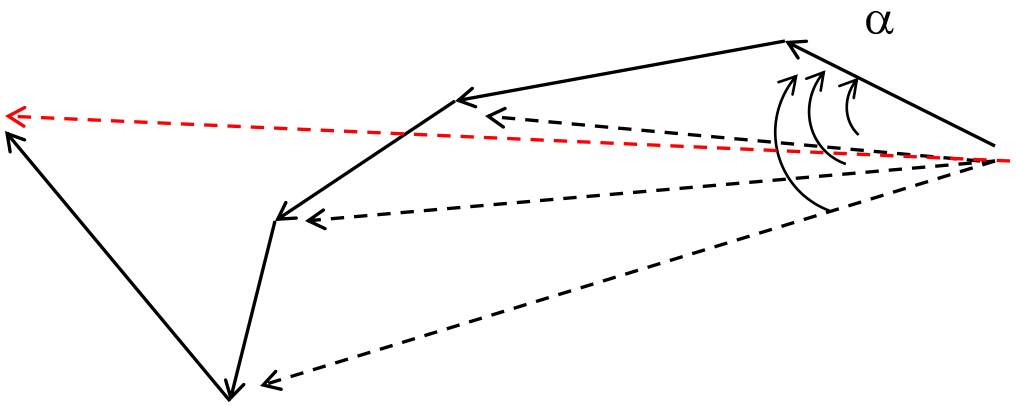


OK

Angle α should always increase
(in absolute value)

Triangulation of (x-)monotone polygon

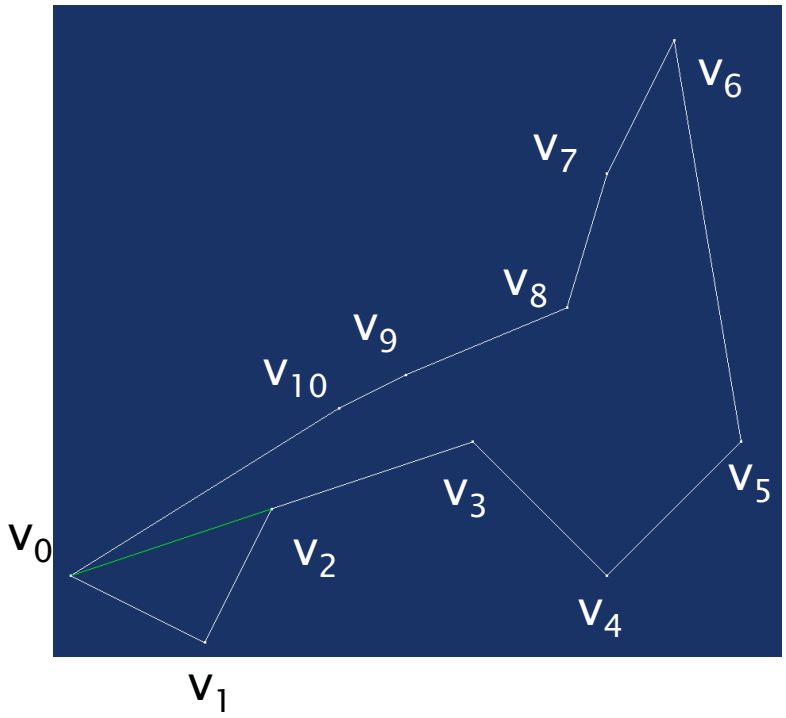
- Cheking if a diagoanal is inside a polygon, n points:



KO

Angle α should always increase
(in absolute value)

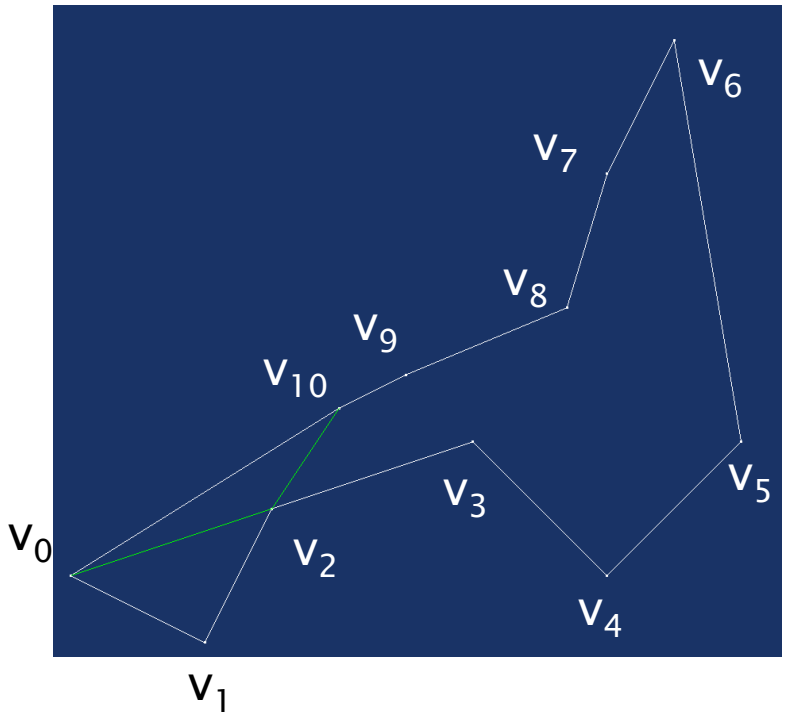
Example



Start stack: P={v_1,v_0}

j=2: v_2, same chain as v_1: diag v_2–v_0; P={v_2,v_0}

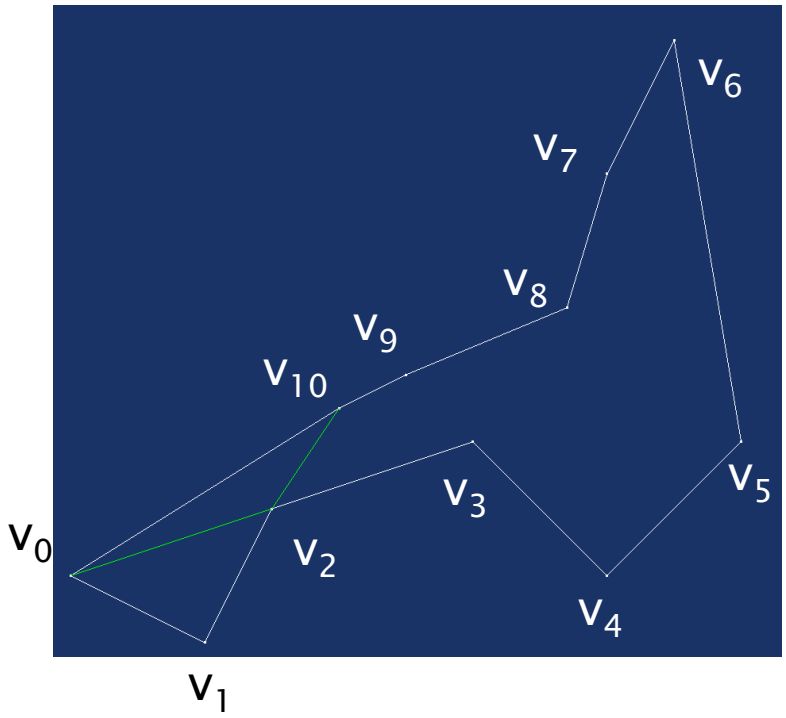
Example



$P=\{v_1,v_0\}$

j=3: v_{10}, chain different from v_2: diag v_{10}–v_2; $P=\{v_{10},v_2\}$

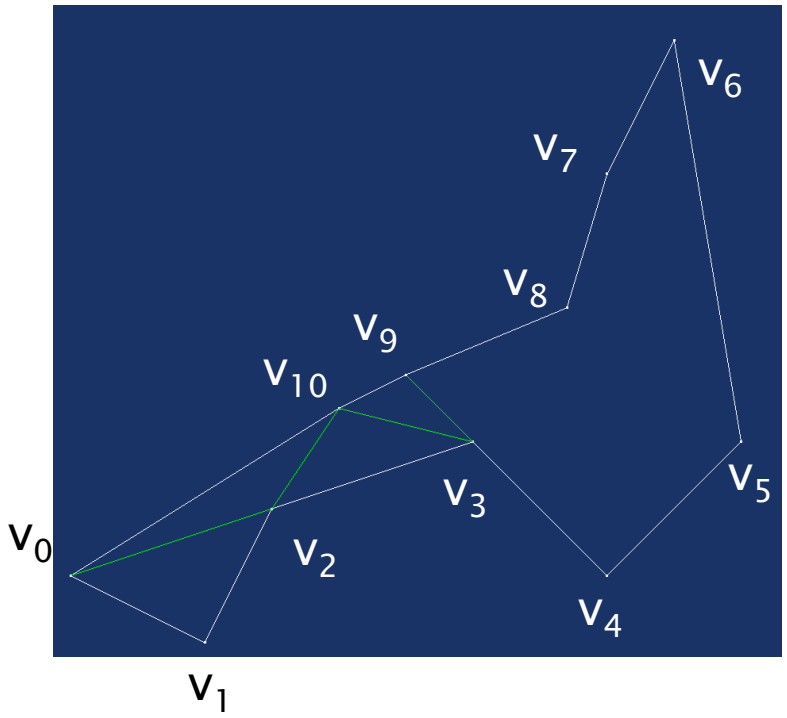
Example



$P=\{v_{10},v_2\}$

j=4: v_9, same chain as v_{10}: no diag ; $P=\{v_9,v_{10},v_2\}$

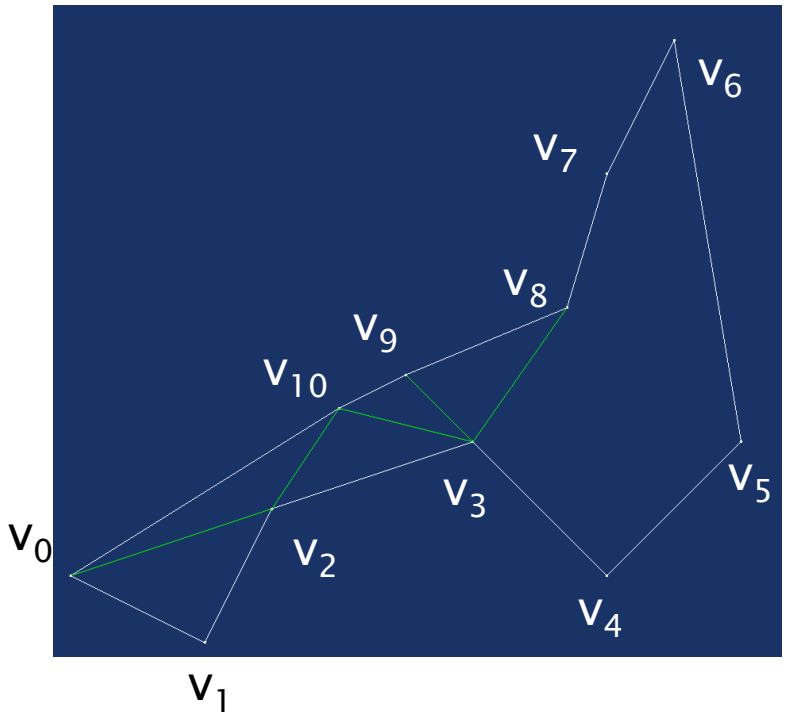
Example



$P=\{v_9,v_{10},v_2\}$

j=5: v_3, chain different from v_9: diag v_3–v_9 and diag v_3–v_{10}; $P=\{v_3,v_9\}$

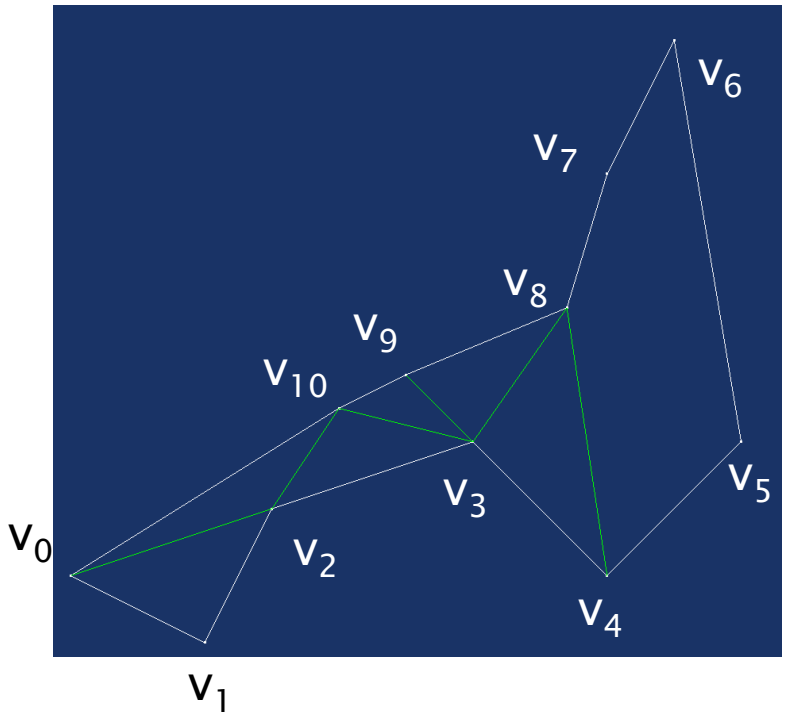
Example



$P=\{v_3,v_9\}$

j=6: v_8, chain different from v_3: diag v_8–v_3; $P=\{v_8,v_3\}$

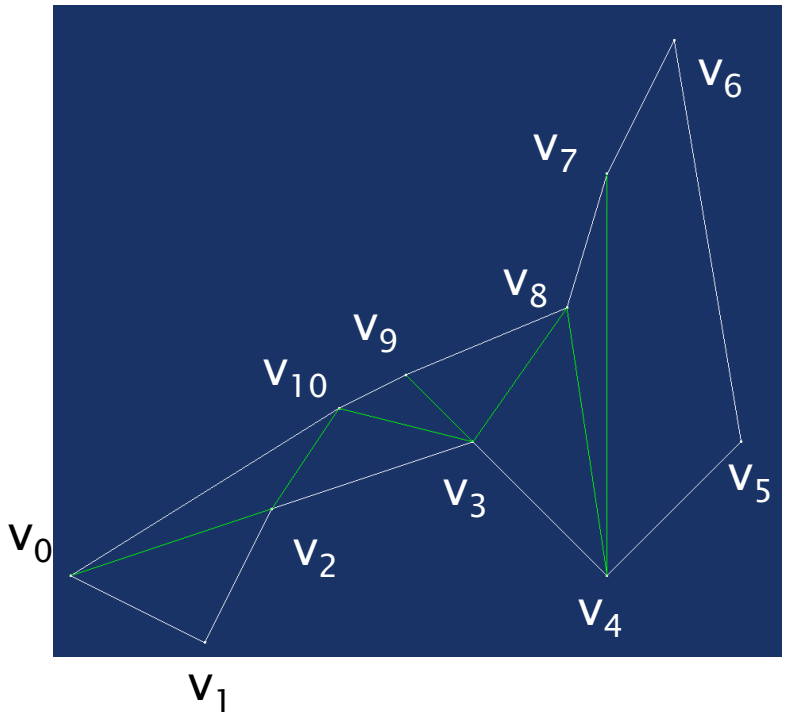
Example



$P=\{v_8,v_3\}$

j=7: v_4, chain different from v_8: diag v_4–v_8; $P=\{v_4,v_8\}$

Example



$P=\{v_4,v_8\}$

$j=8$: v_7, chain different from v_4: diag v_7–v_4; $P=\{v_7,v_4\}$
And so on…