PFLOCK Report

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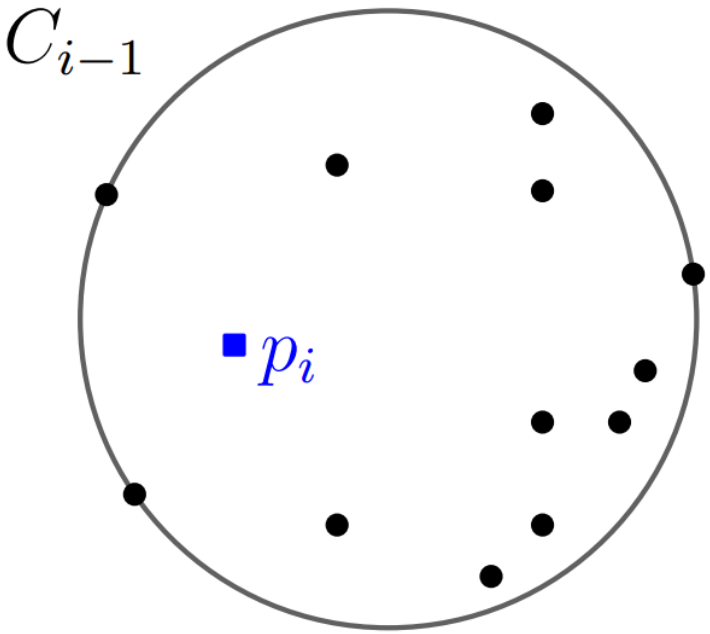
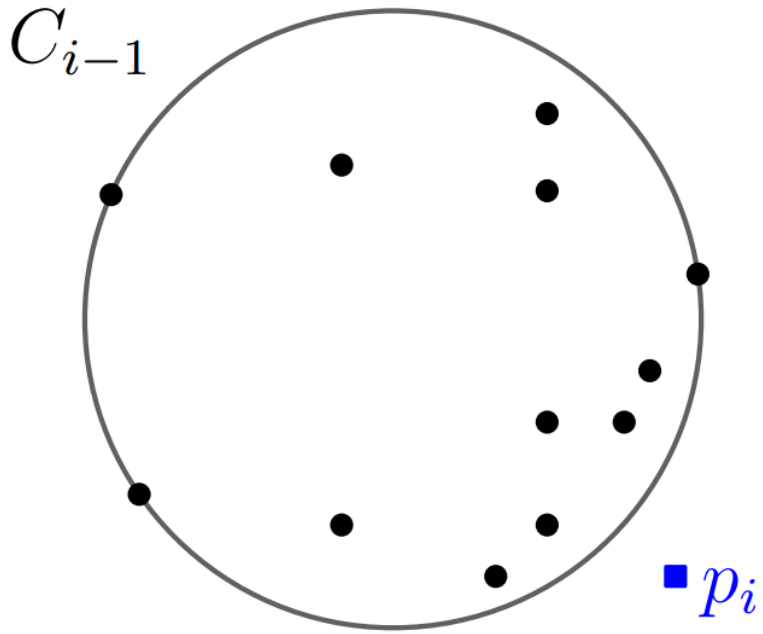
Welzl's algorithm...

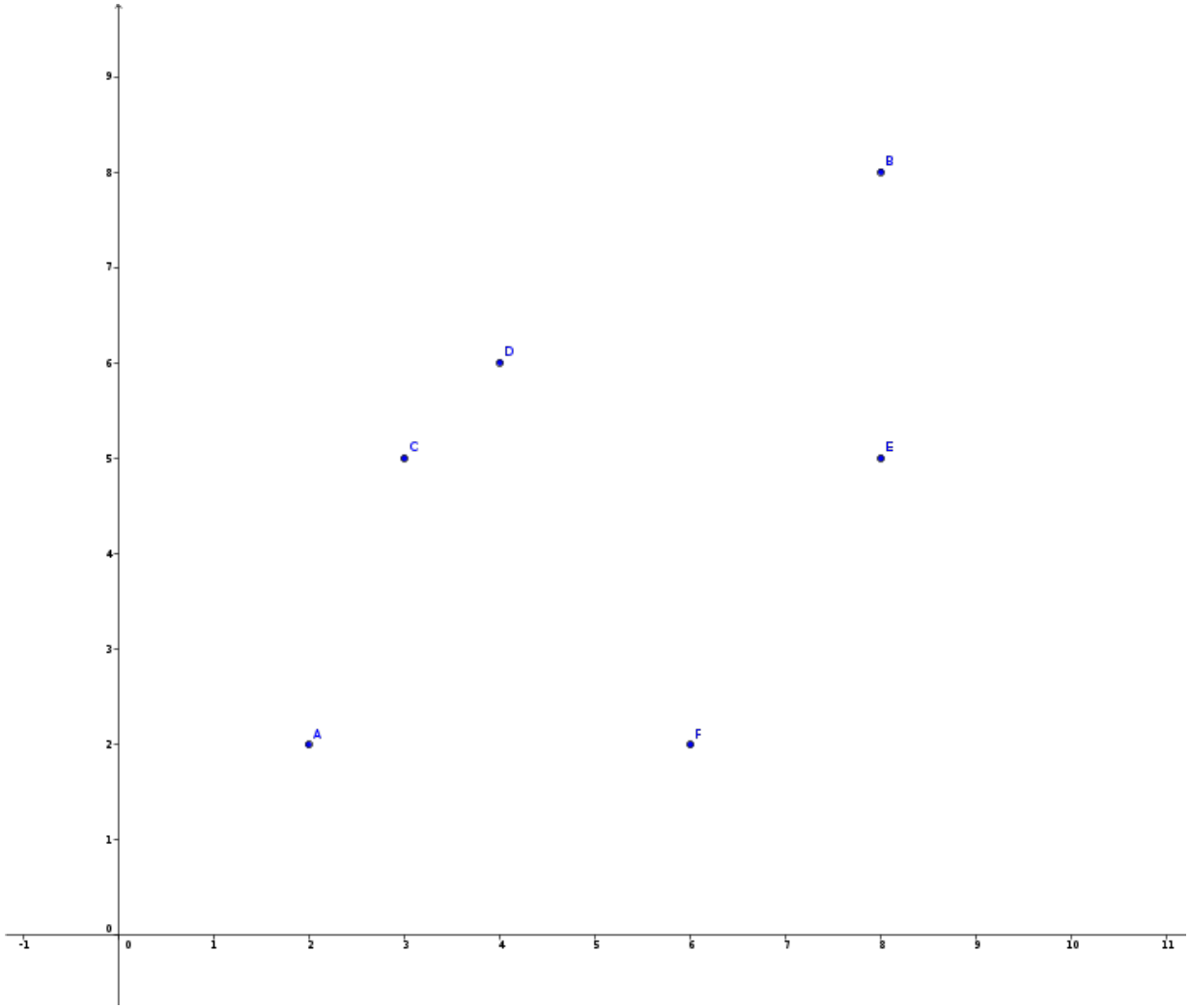
Foundation





Welzl's algorithm...

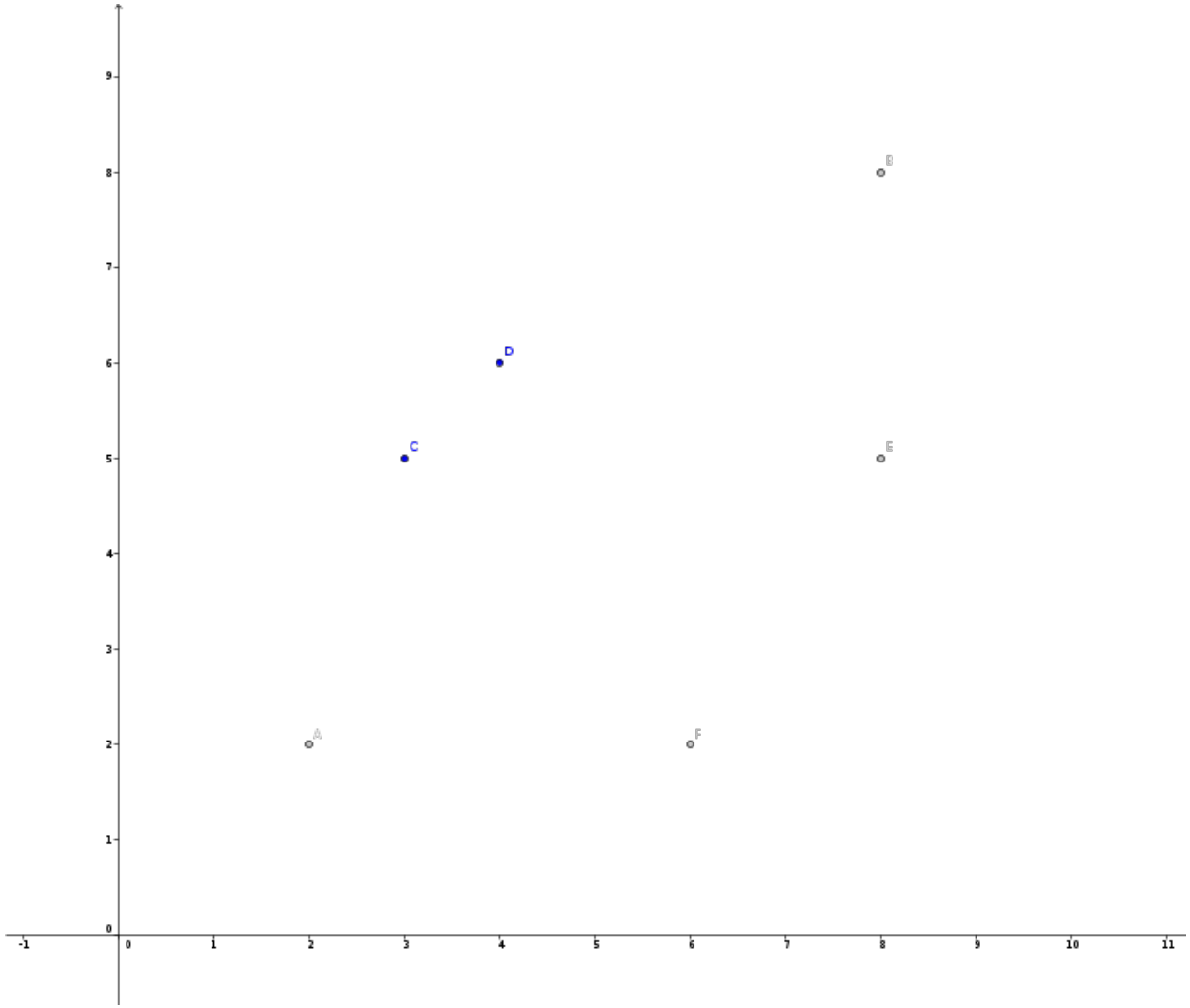
Example



$$P = \{C, D, E, F, A, B\}$$

Welzl's algorithm...

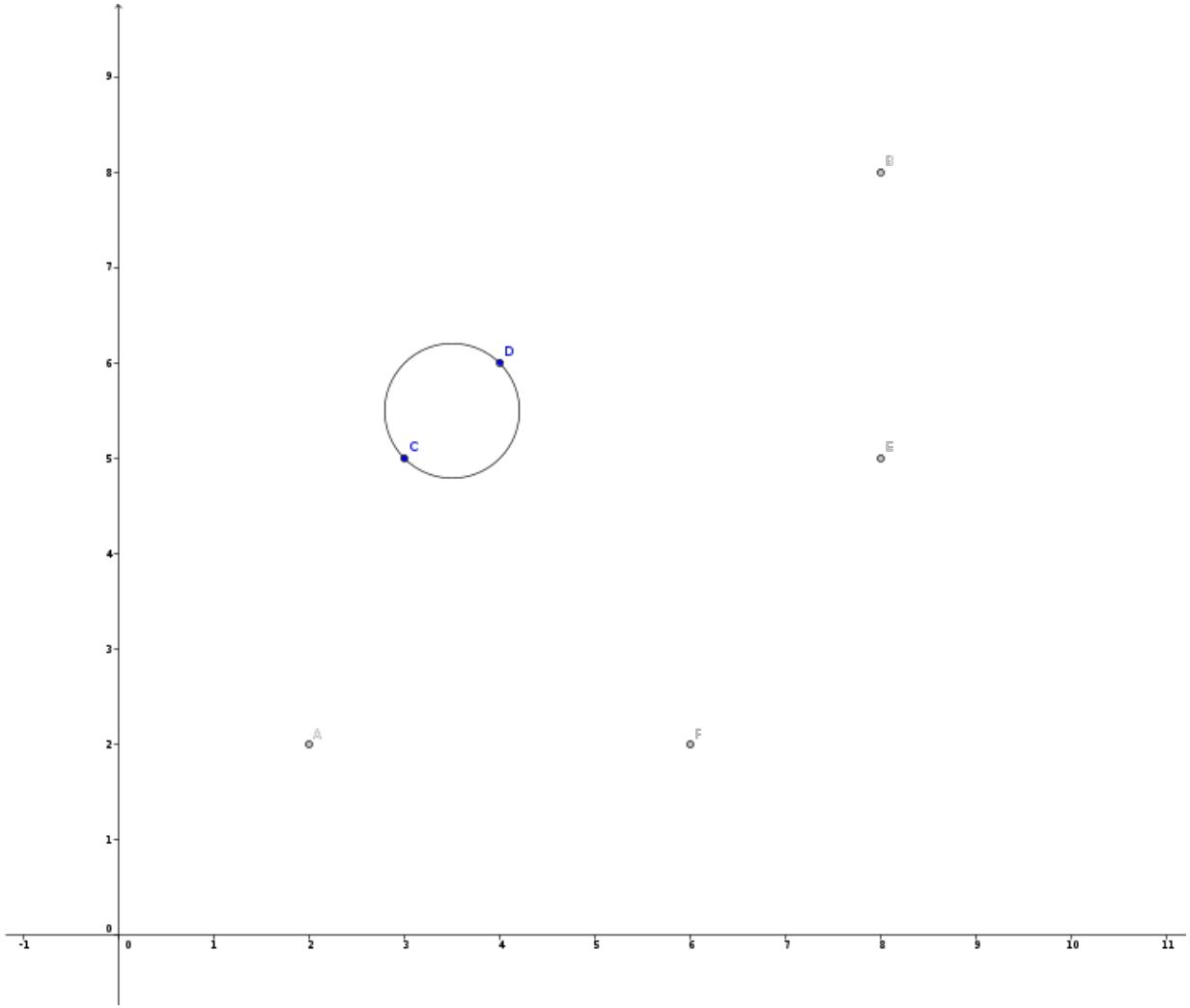
Example



$$P = \{C, D, E, F, A, B\}$$

Welzl's algorithm...

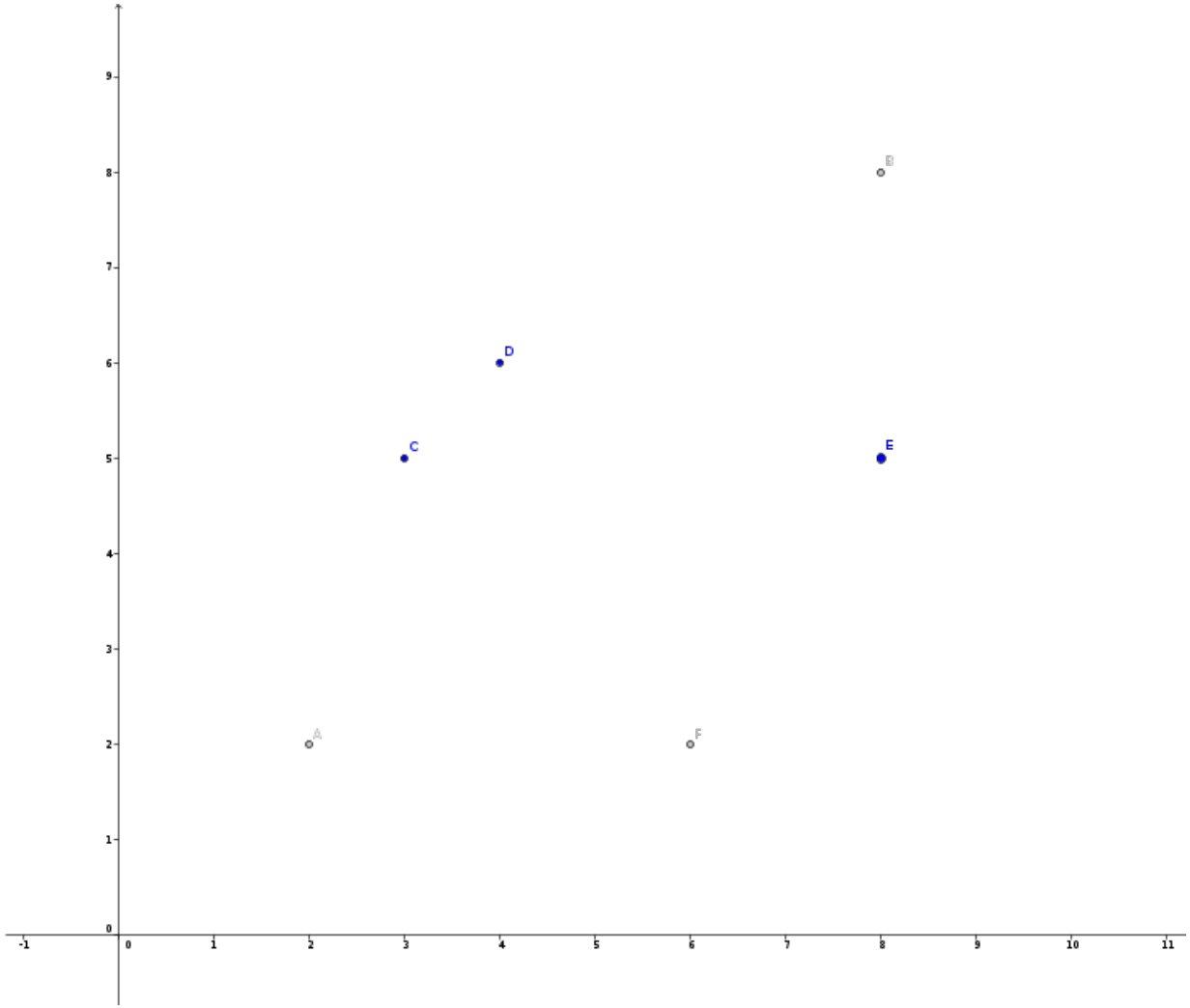
Is next point inside the current disk?



$$P = \{C, D, \mathbf{E}, F, A, B\}$$

Welzl's algorithm...

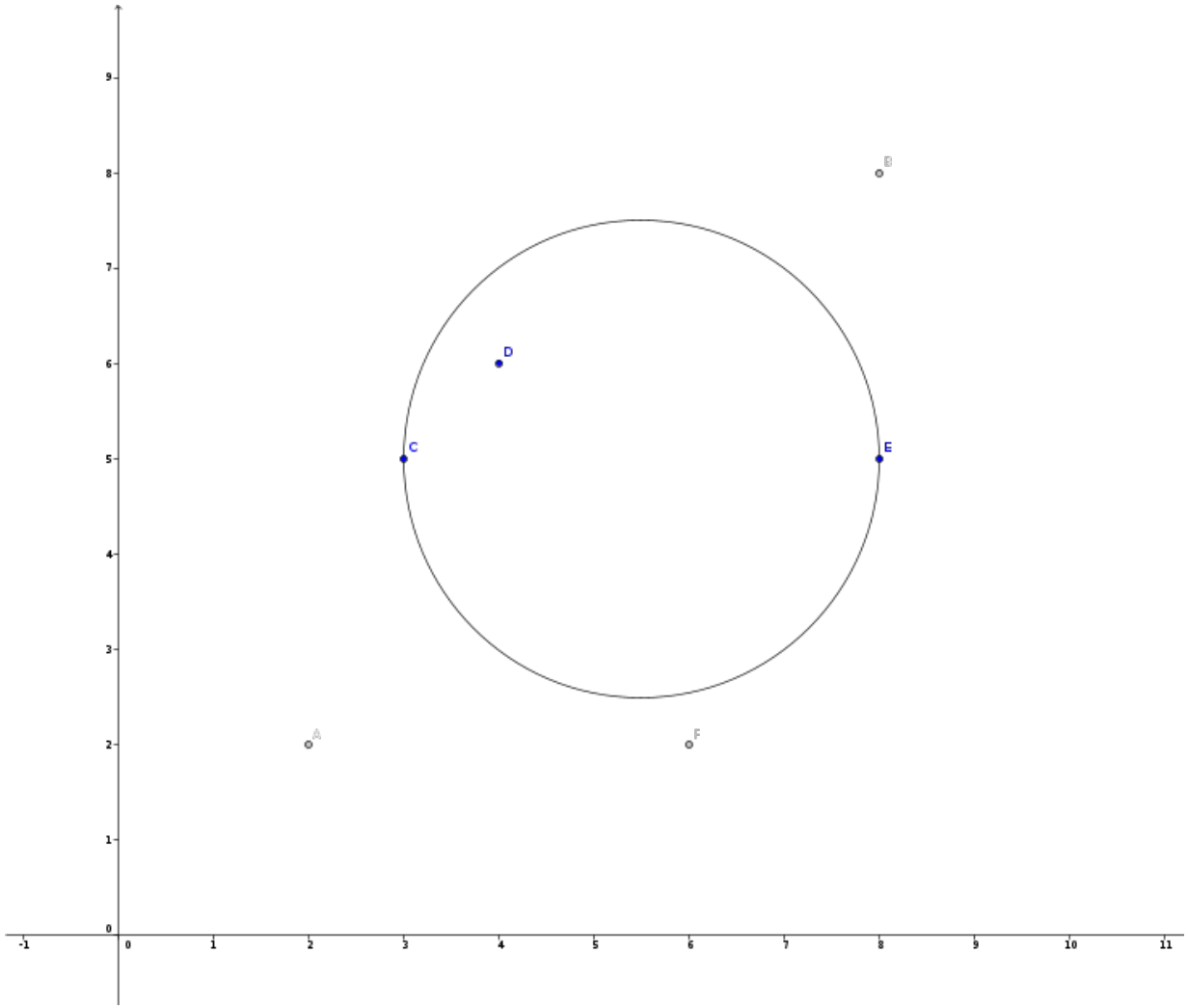
Now new point must be in the boundary and Move To The Front heuristic...



$$P = \{E, C, D, F, A, B\}$$

Welzl's algorithm...

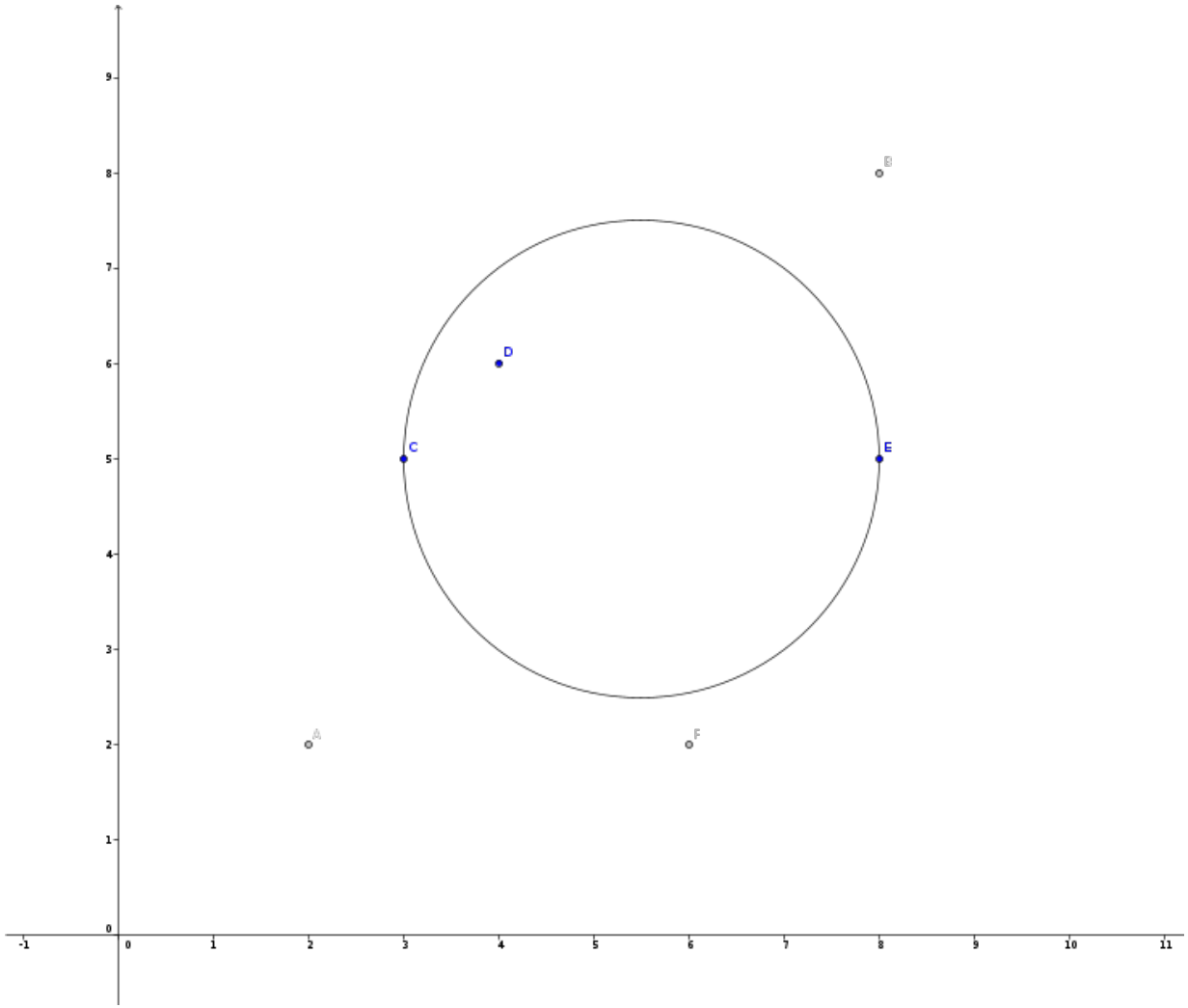
Repeat the process for subsequent points...



$$P = \{E, C, D, F, A, B\}$$

Welzl's algorithm...

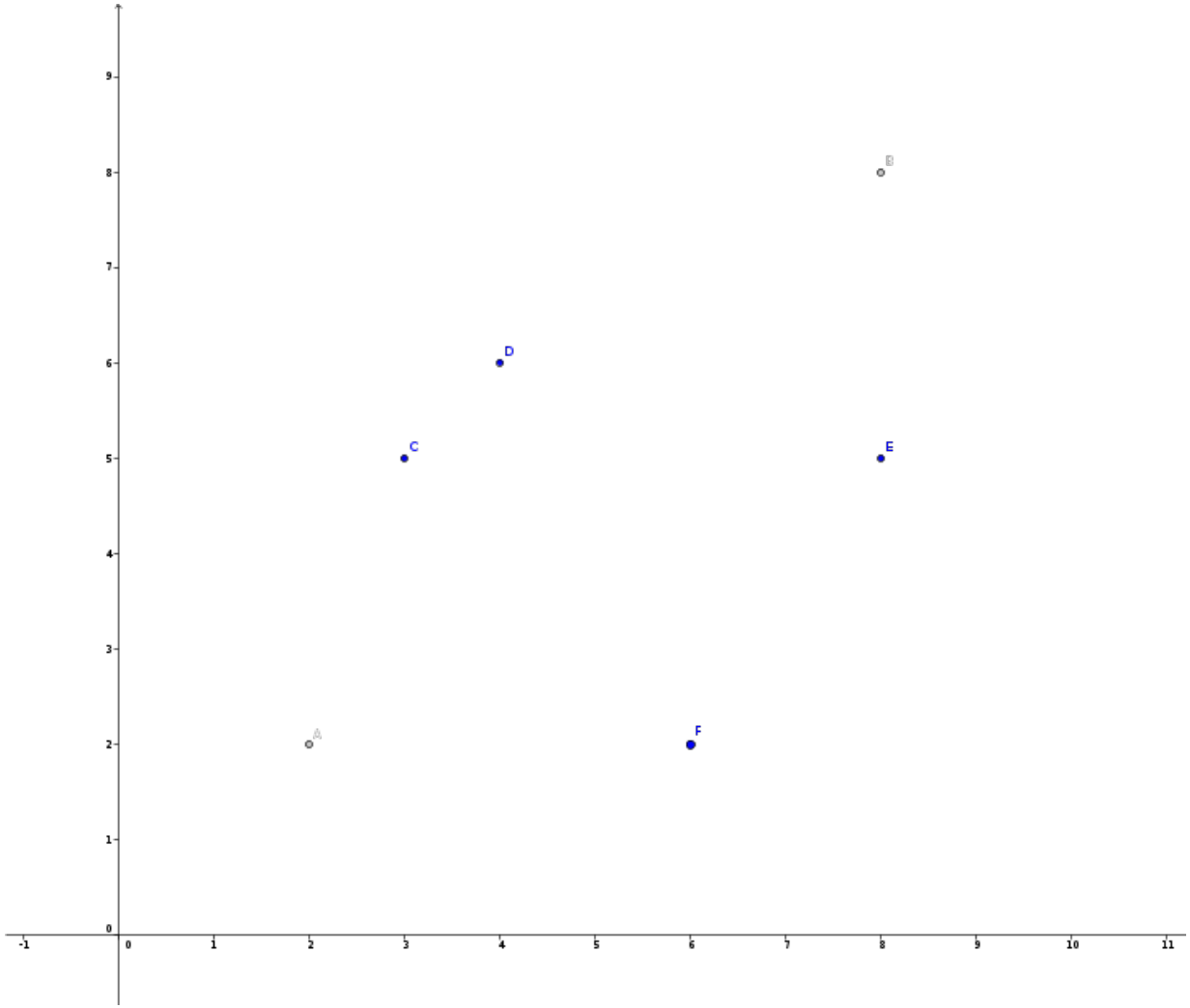
Repeat the process for subsequent points...



$$P = \{E, C, D, \mathbf{F}, A, B\}$$

Welzl's algorithm...

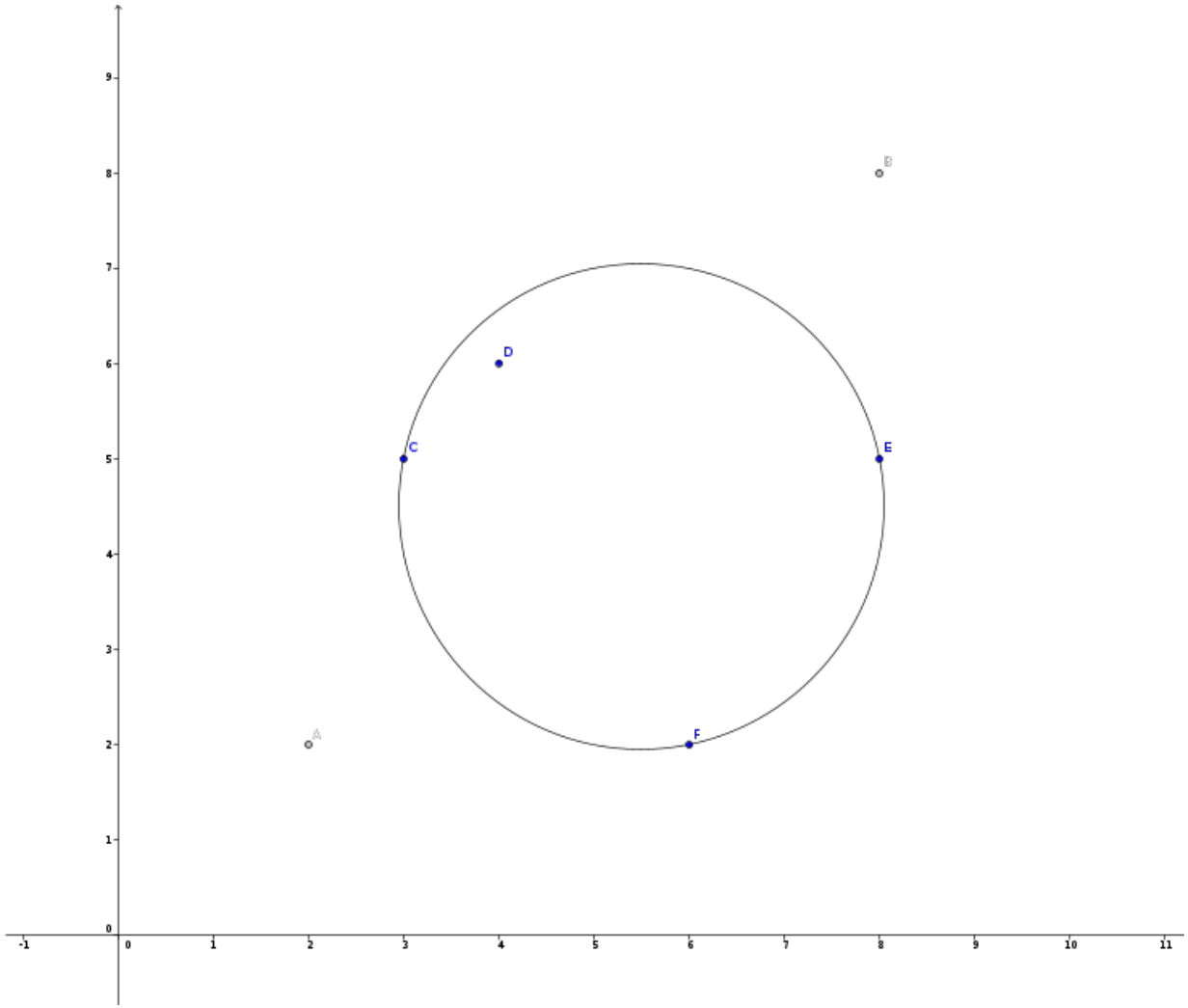
Move to the front...



$$P = \{F, C, E, D, A, B\}$$

Welzl's algorithm...

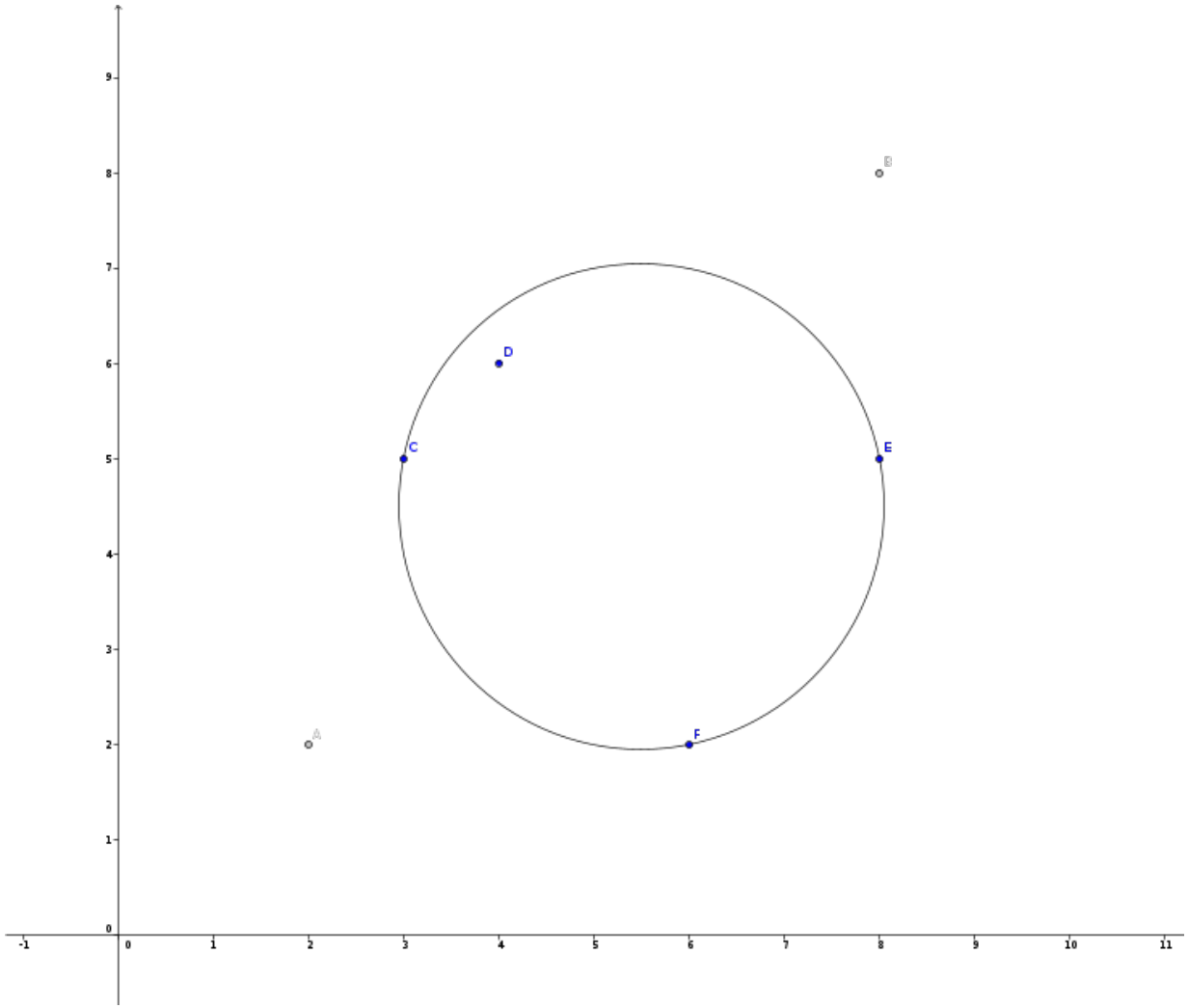
Find new disk...



$$P = \{F, C, E, D, A, B\}$$

Welzl's algorithm...

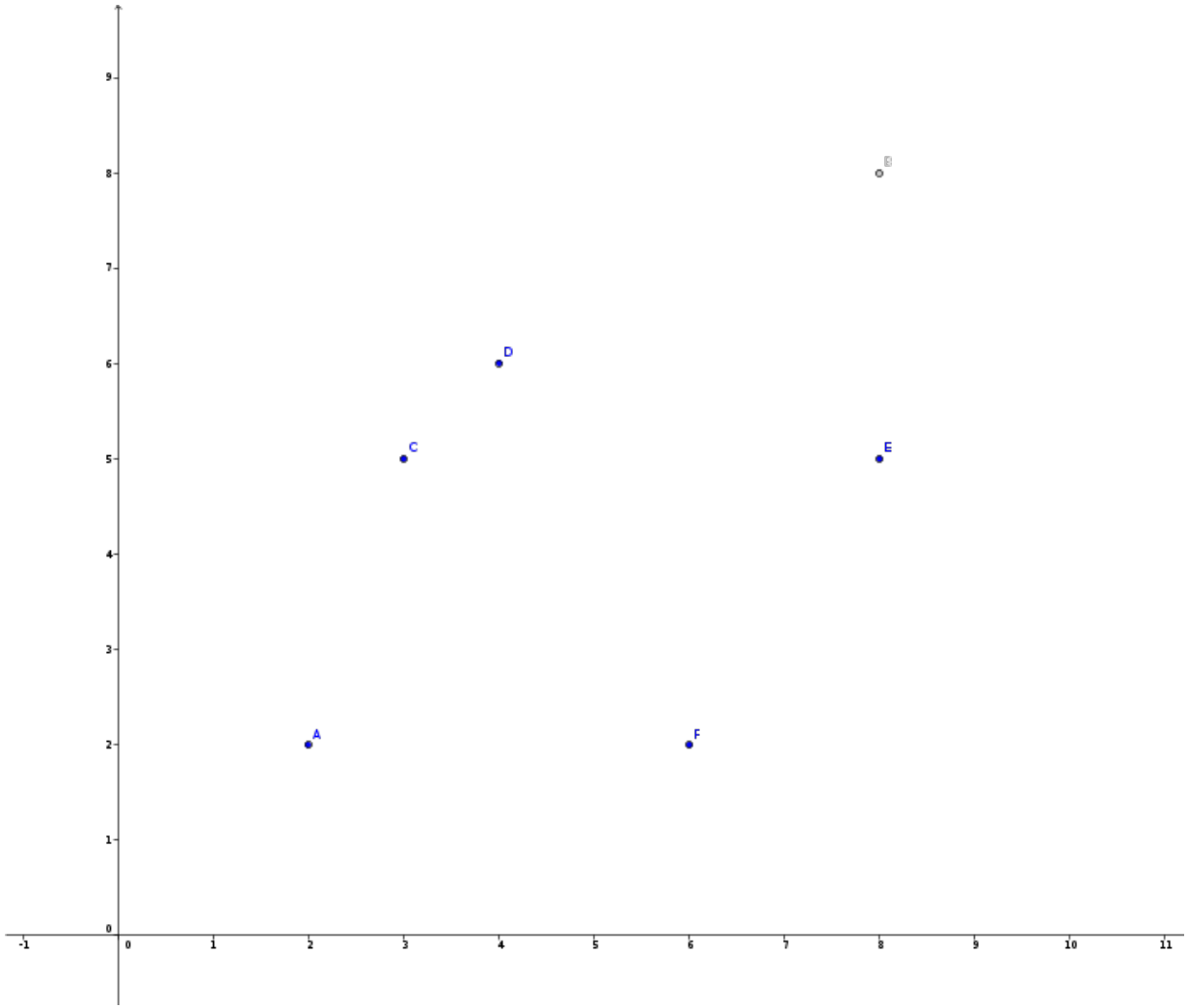
Query new point...



$$P = \{F, C, E, D, \mathbf{A}, B\}$$

Welzl's algorithm...

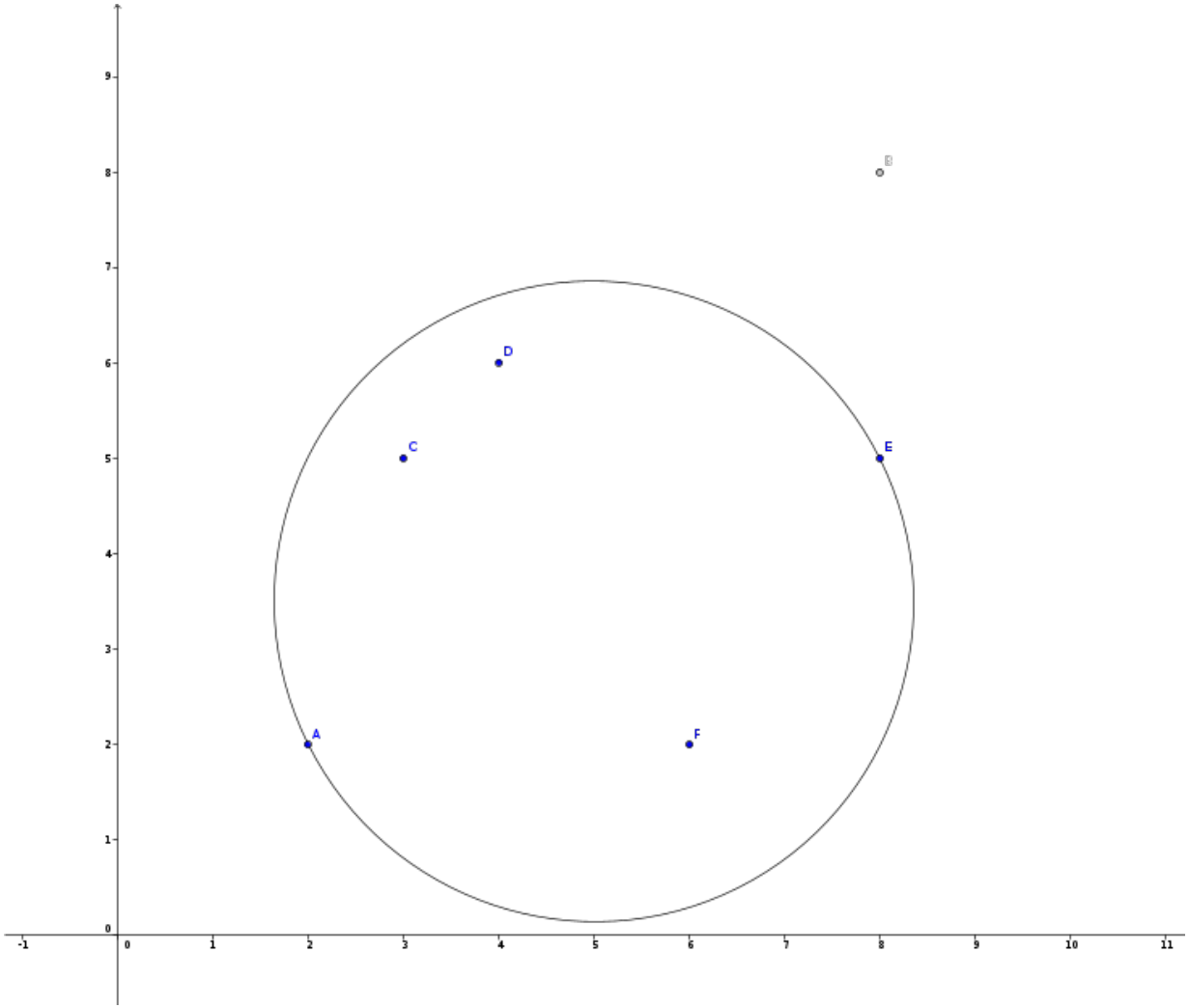
Move to the front...



$$P = \{A, F, C, E, D, B\}$$

Welzl's algorithm...

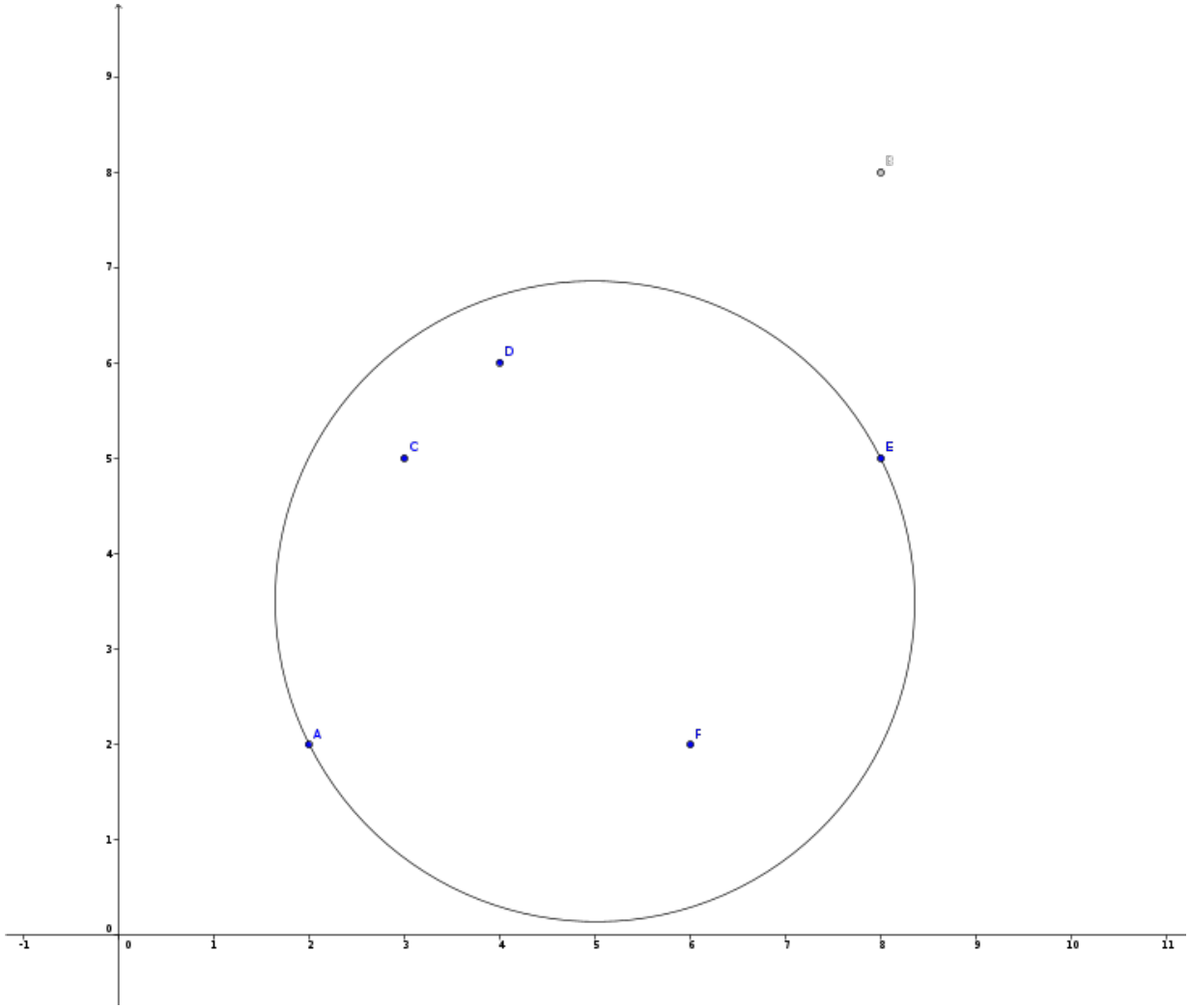
Find new disk...



$$P = \{A, F, C, E, D, B\}$$

Welzl's algorithm...

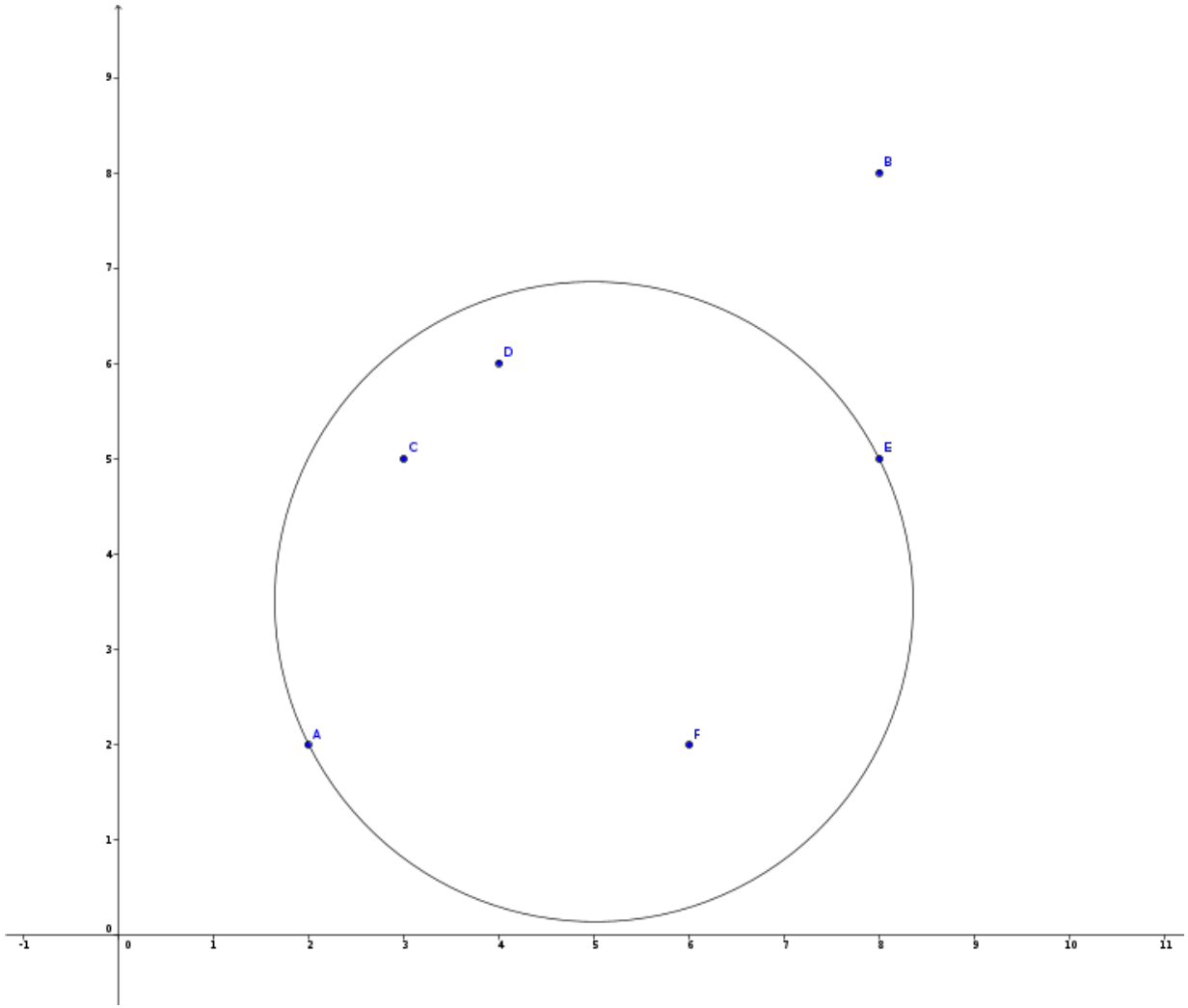
Query new point...



$$P = \{A, F, C, E, D, \mathbf{B}\}$$

Welzl's algorithm...

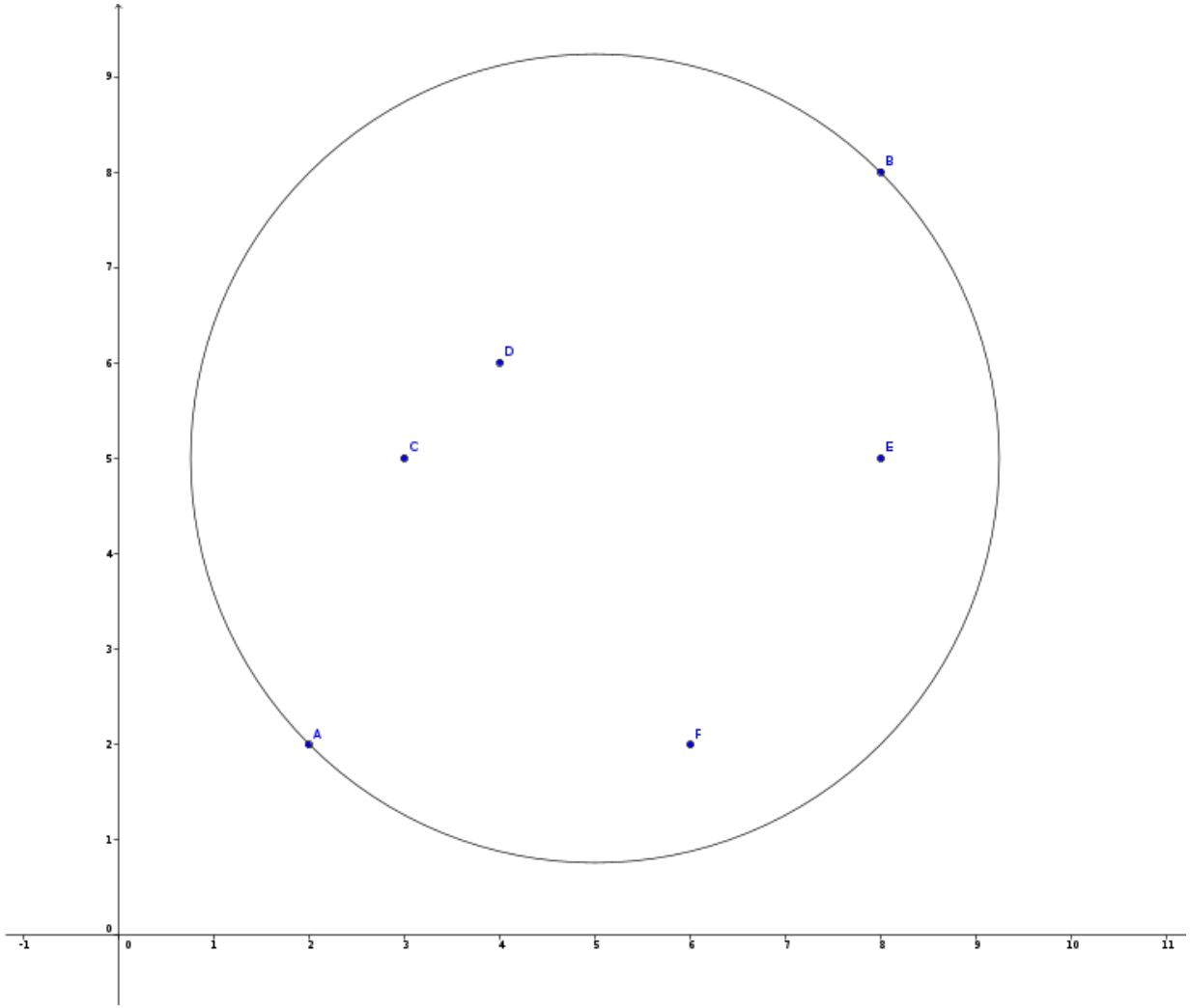
Move to the front...



$$P = \{B, A, E, F, C, D\}$$

Welzl's algorithm...

Finally



$$P = \{B, A, E, F, C, D\}$$

Welzl's algorithm...

Expected $O(n)$ complexity

n	Running Time (μsec)
10	14
10^2	77
10^3	619
10^4	6156
10^5	83488
10^6	1051354
10^7	12889873

Table: Running time vs n

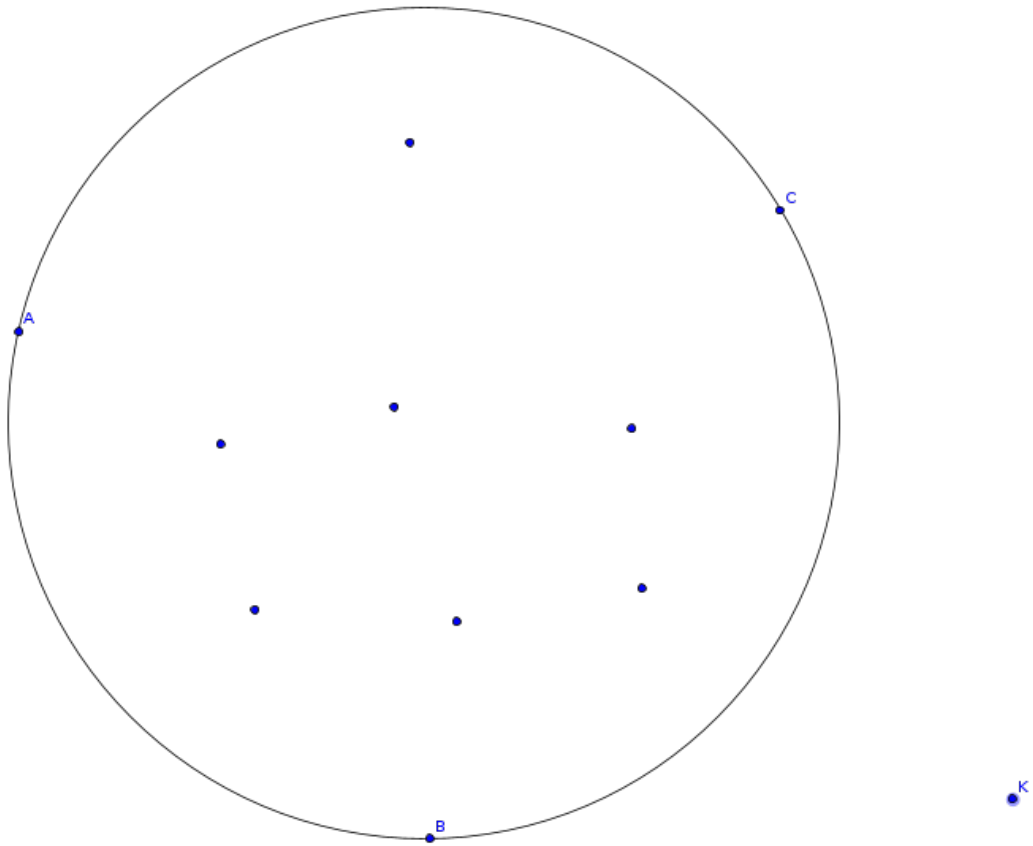
Table: Average number of calls to Algorithm 2 vs n

n	Number of calls
10	5
10^2	11
10^3	18
10^4	26
10^5	32
10^6	39
10^7	46

from `https://www.cse.iitk.ac.in/users/ssahai/talks/sec.pdf`

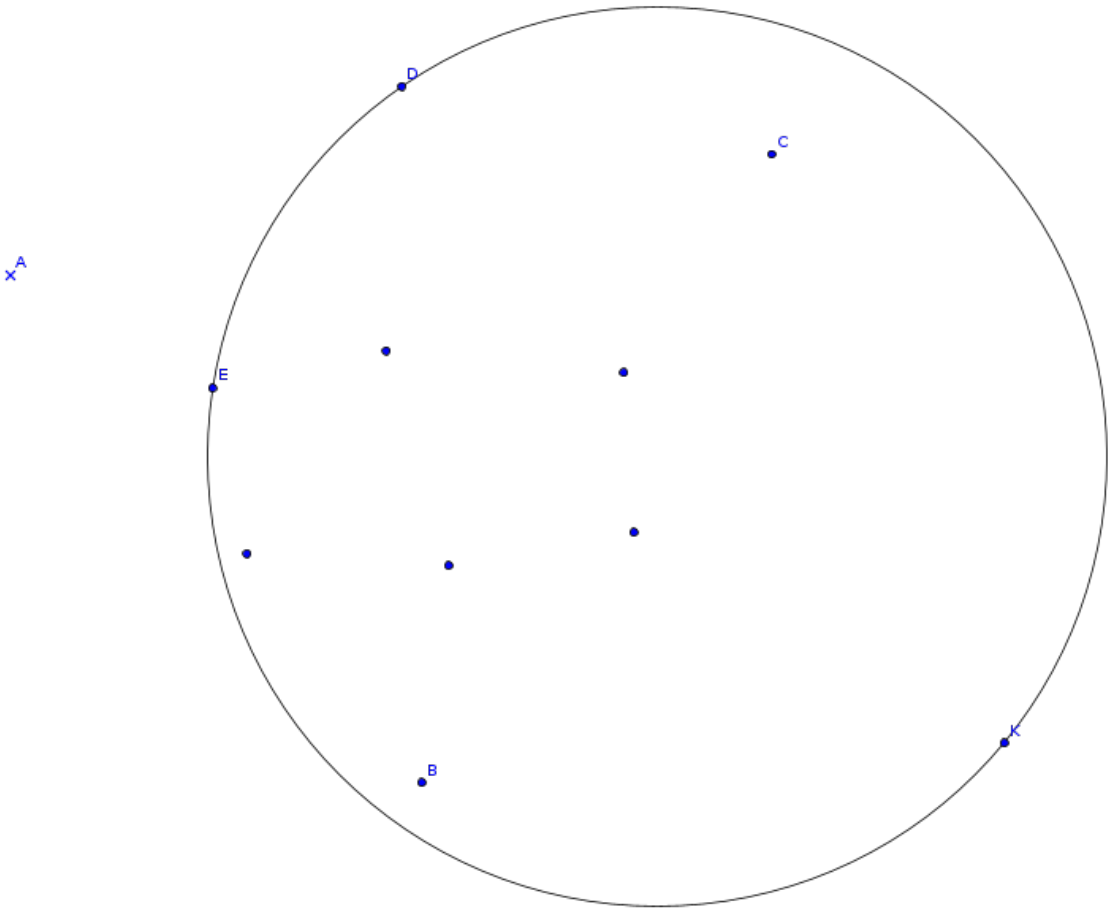
Adaptation to Flocks - Adding

Adding a new point



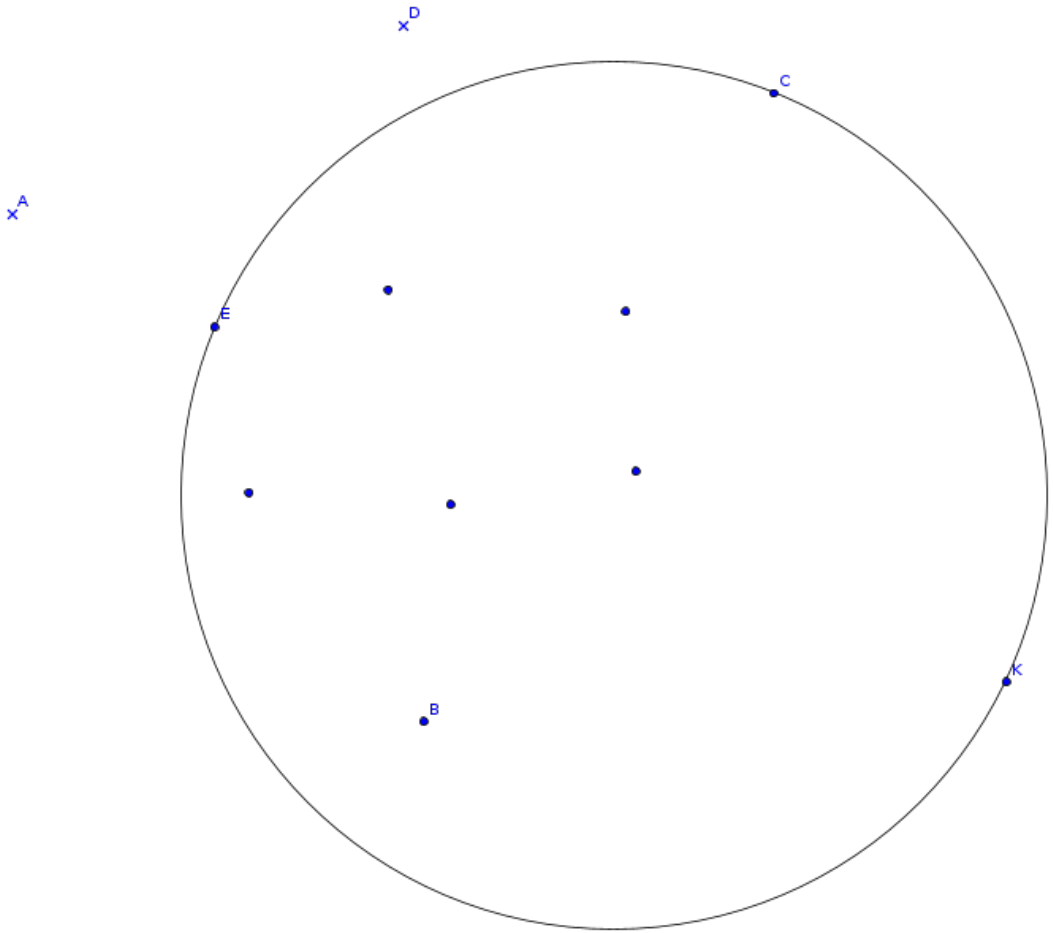
Adaptation to Flocks - Adding

Keep new point in boundary, remove farthest one...



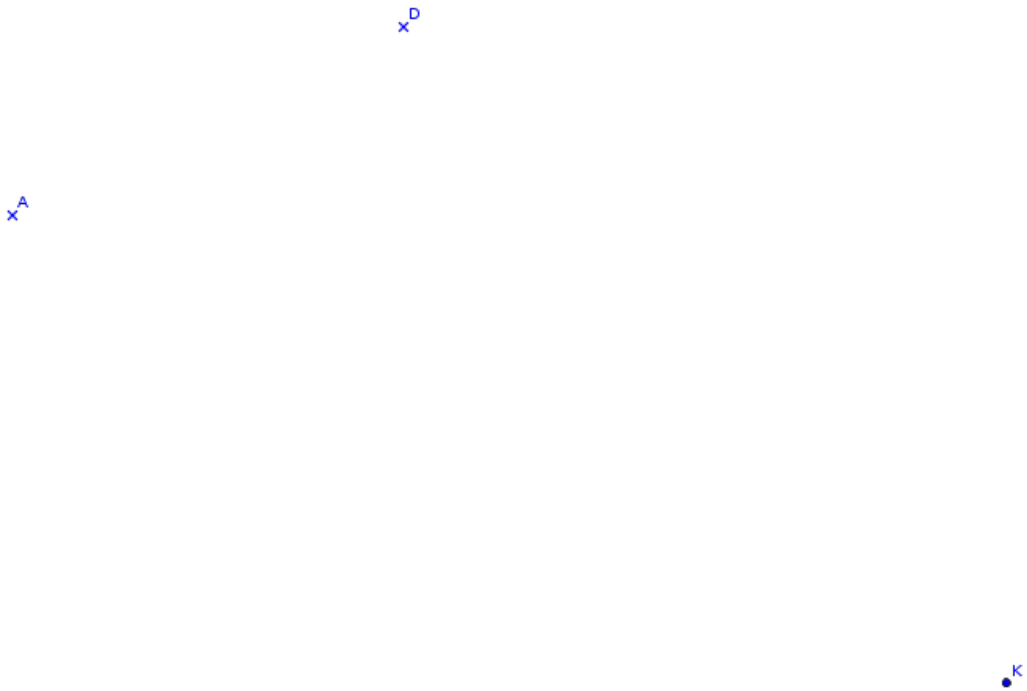
Adaptation to Flocks - Adding

Repeat until $disk < \varepsilon$...



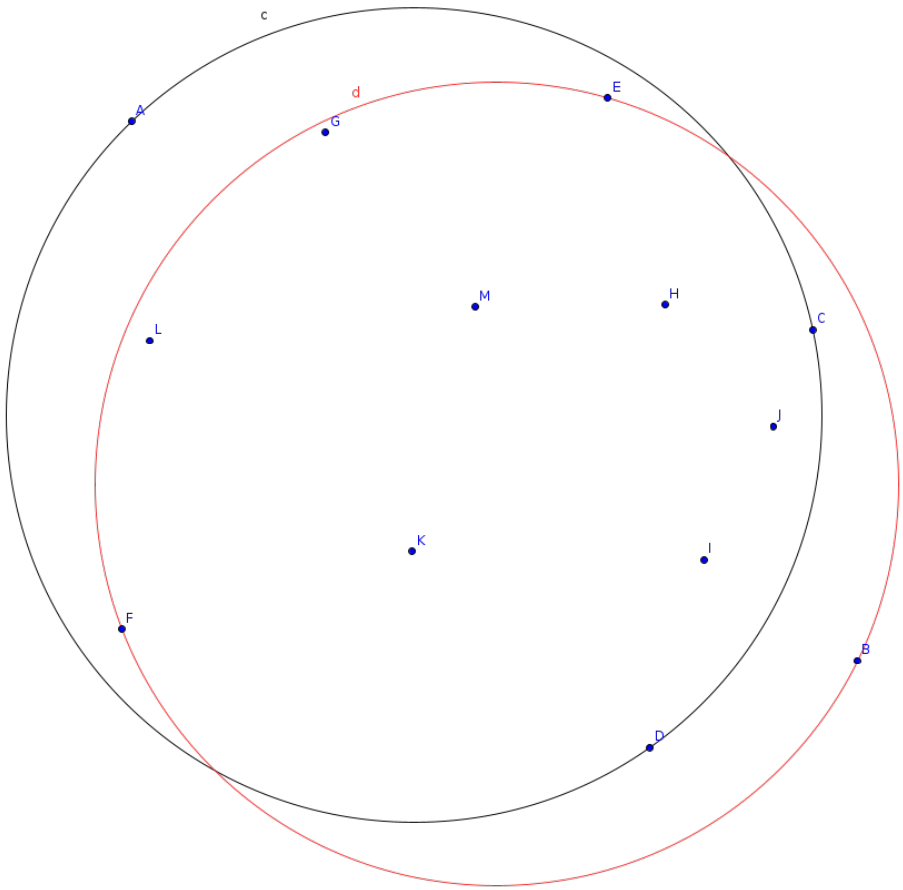
Adaptation to Flocks - Adding

Find flocks for previous points in boundary...



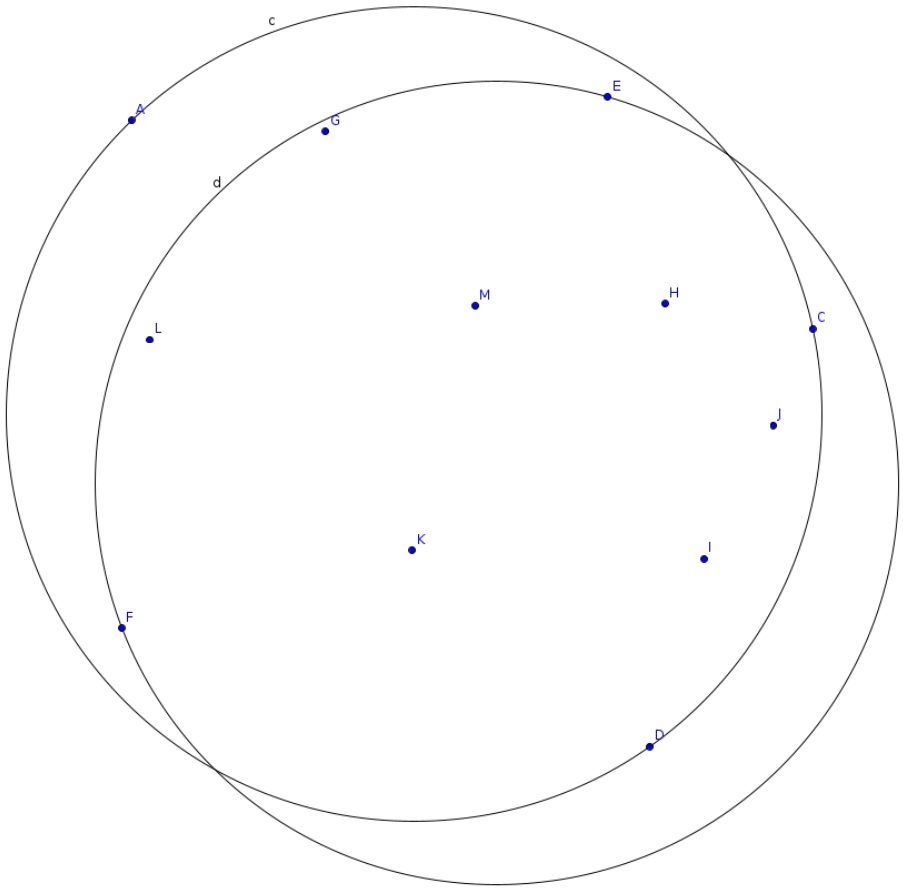
Adaptation to Flocks - Removing

Identify disk(s) which intersect the point...



Adaptation to Flocks - Removing

Delete point from disk(s)...



Adaptation to Flocks - Removing

Prune redundants and duplicates...