

Using orientation tests to solve basic problems on polygons

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USING ORIENTATION TESTS ON POLYGONS

Intersection test line - polygon

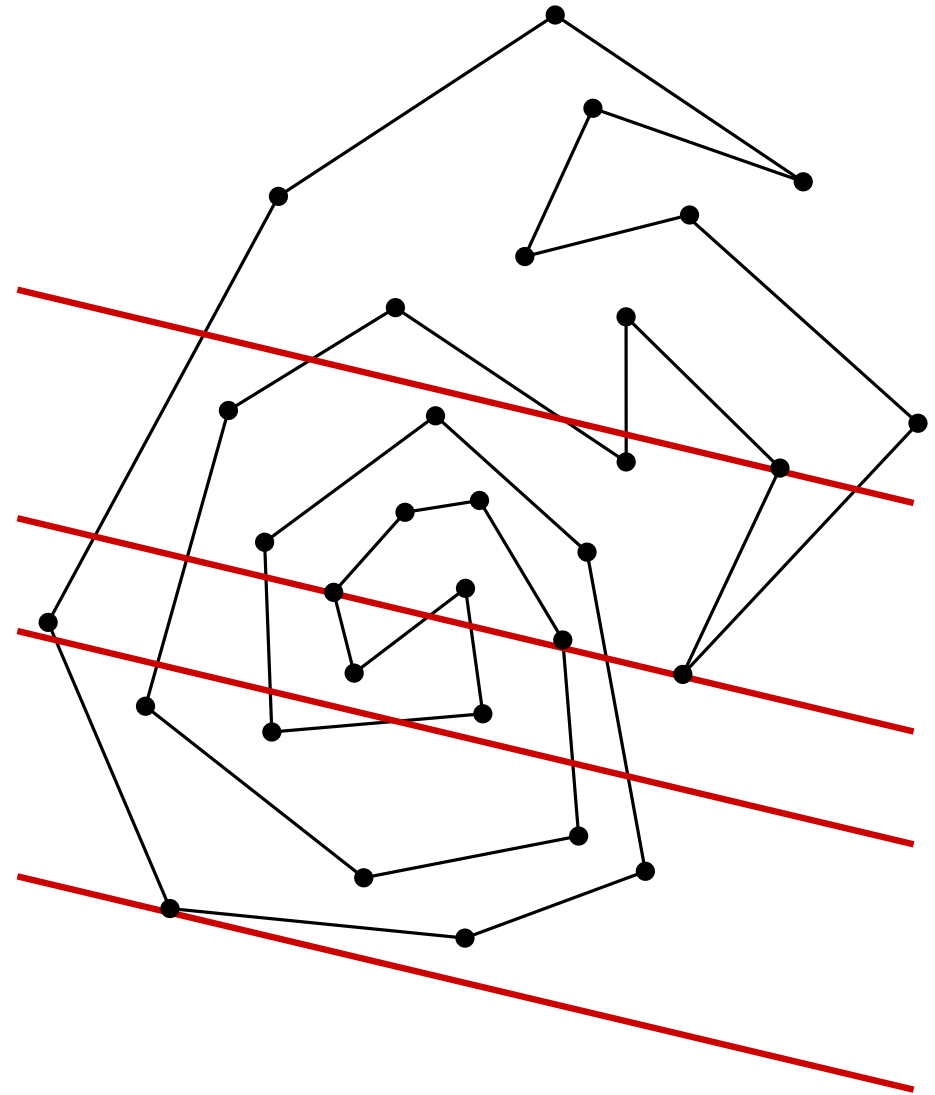
Input:

ℓ : a line (through p and q)

P : a polygon (with vertices p_1, p_2, \dots, p_m)

Yes/No they intersect.

If they do, the edges of P intersecting ℓ



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Input:

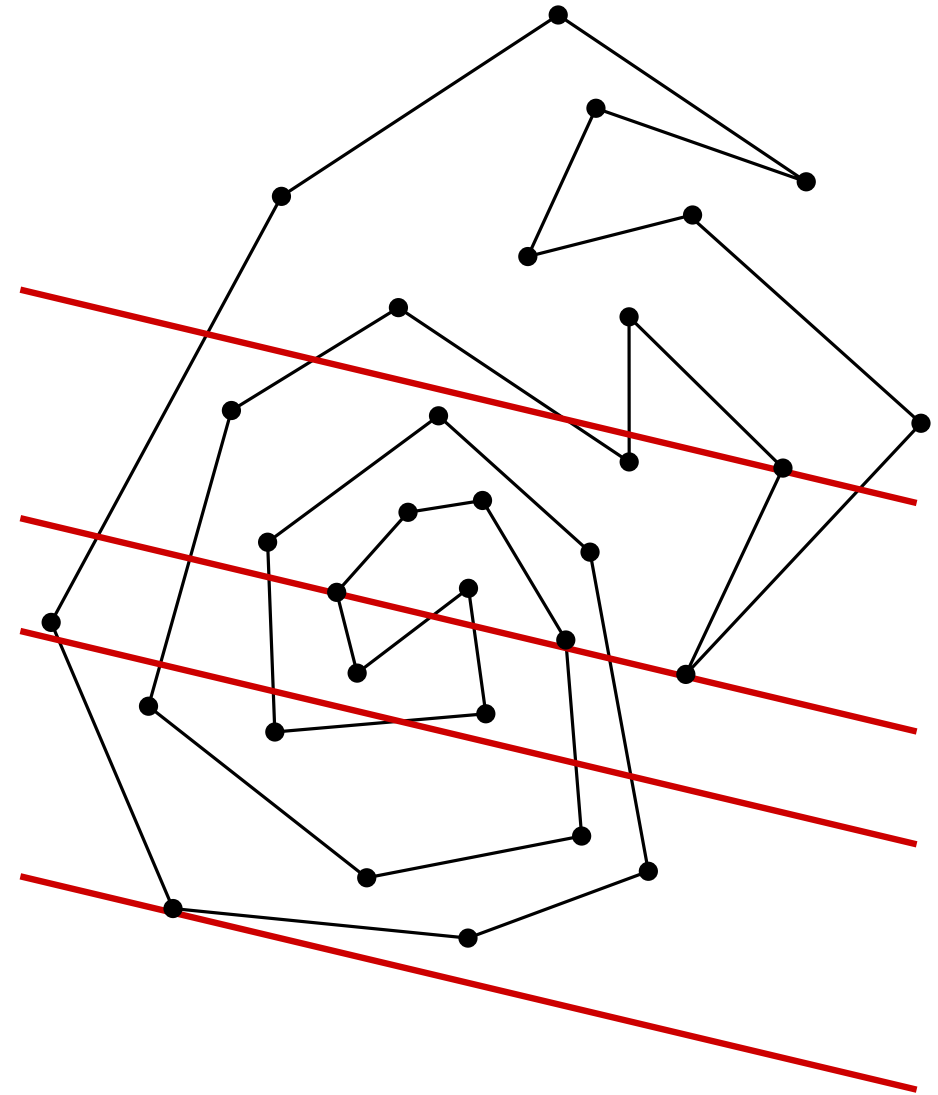
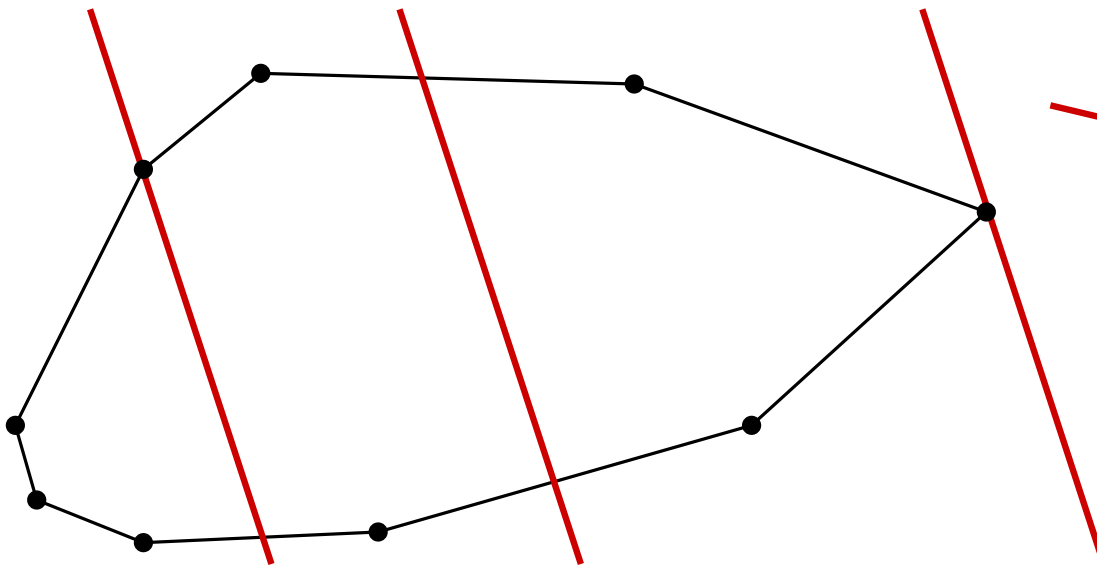
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What if the polygon is convex?



USING ORIENTATION TESTS ON POLYGONS

Point in polygon test

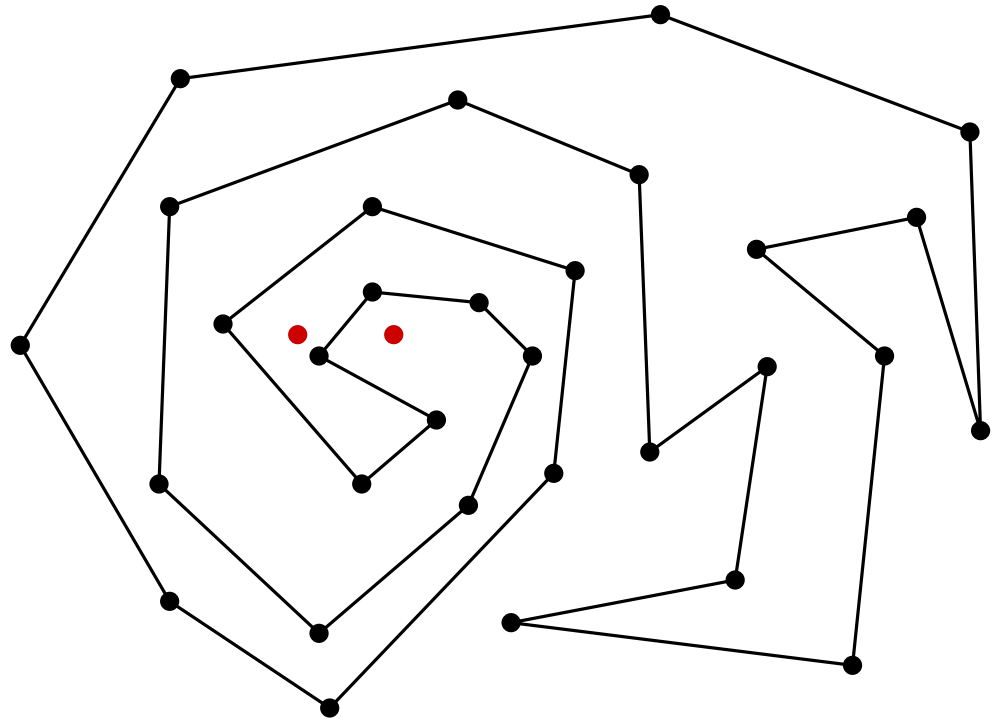
Input:

A polygon p_1, p_2, \dots, p_n

A query point q

Output:

Yes/No $q \in P$



USING ORIENTATION TESTS ON POLYGONS

Point in polygon test

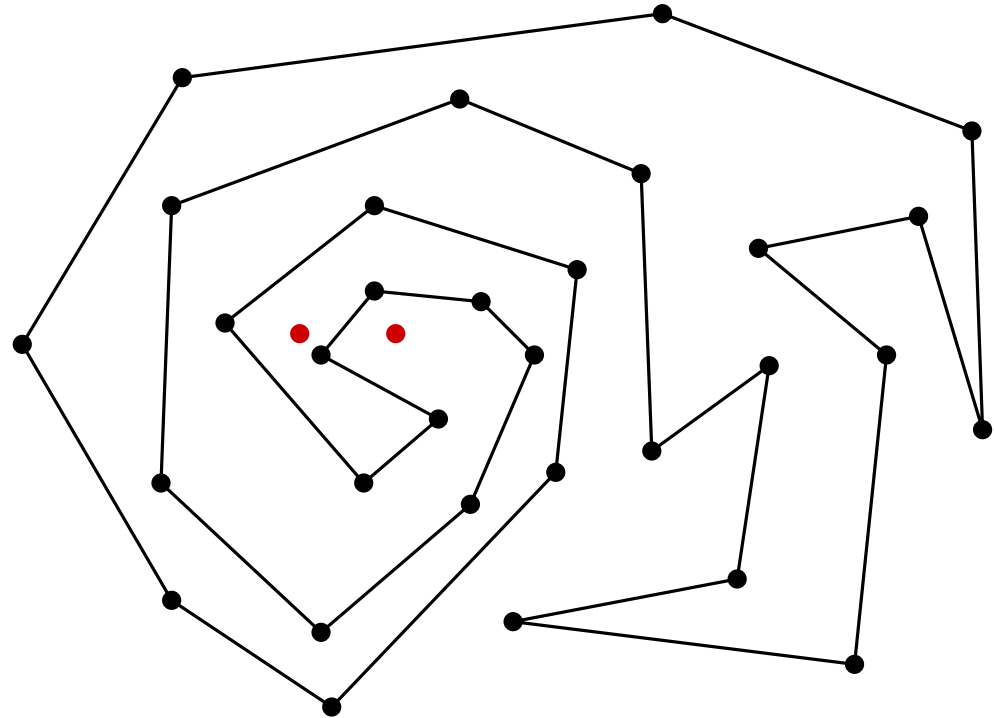
Input:

A polygon p_1, p_2, \dots, p_n

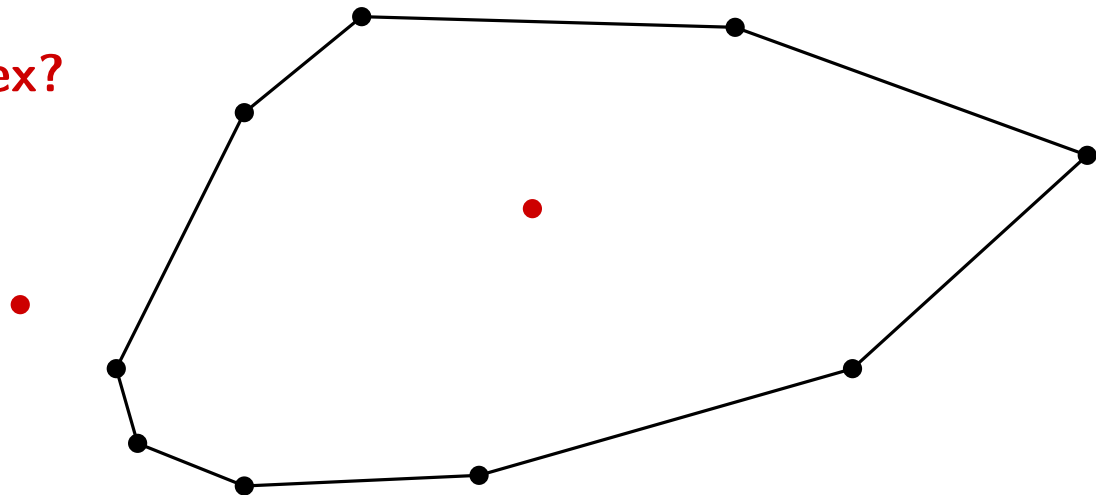
A query point q

Output:

Yes/No $q \in P$



What if the polygon is convex?



USING ORIENTATION TESTS ON POLYGONS

Supporting lines point - polygon

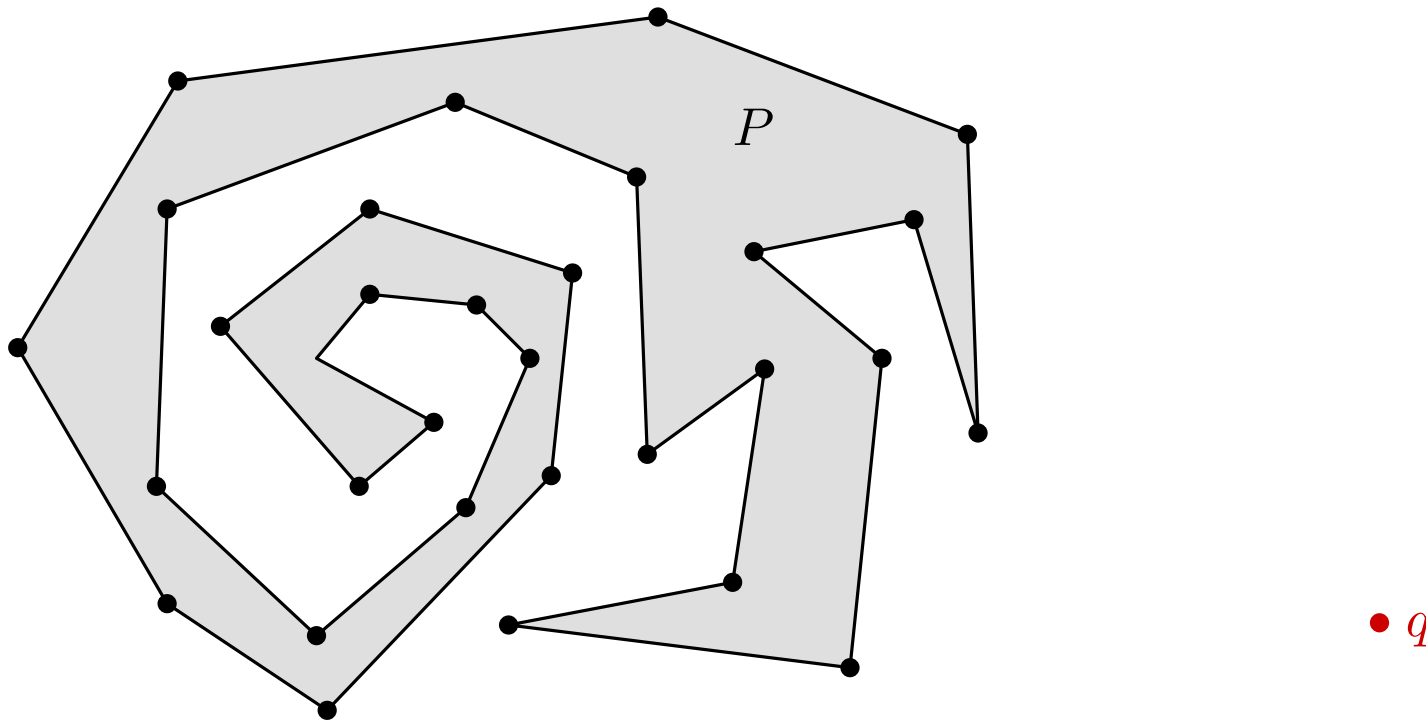
Input:

A polygon P with vertices p_1, p_2, \dots, p_n

A point q not belonging to the convex hull of P

Output:

Lines through q and P that leave all of P to one side



USING ORIENTATION TESTS ON POLYGONS

Supporting lines point - polygon

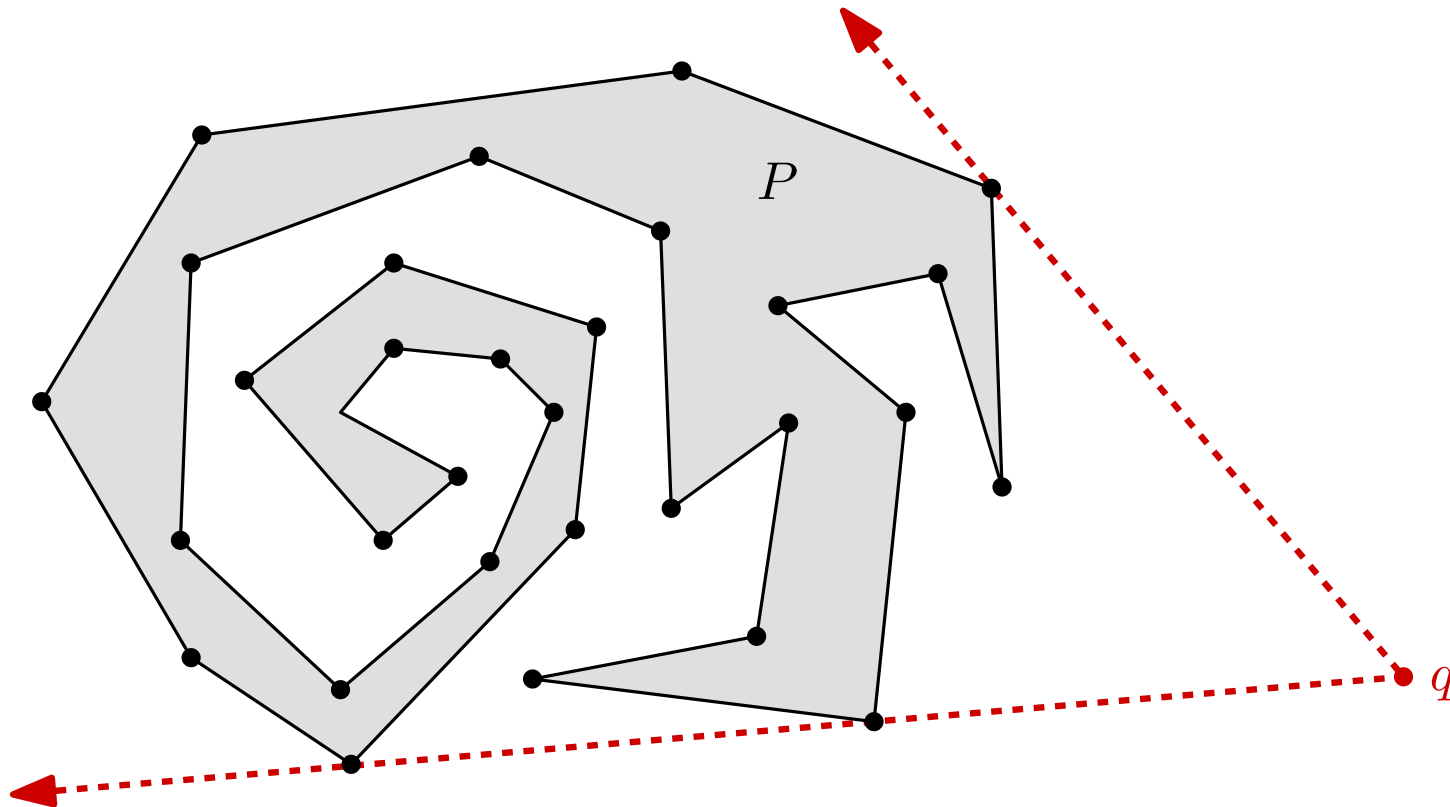
Input:

A polygon P with vertices p_1, p_2, \dots, p_n

A point q not belonging to the convex hull of P

Output:

Lines through q and P that leave all of P to one side



USING ORIENTATION TESTS ON POLYGONS

Supporting lines point - polygon

Input:

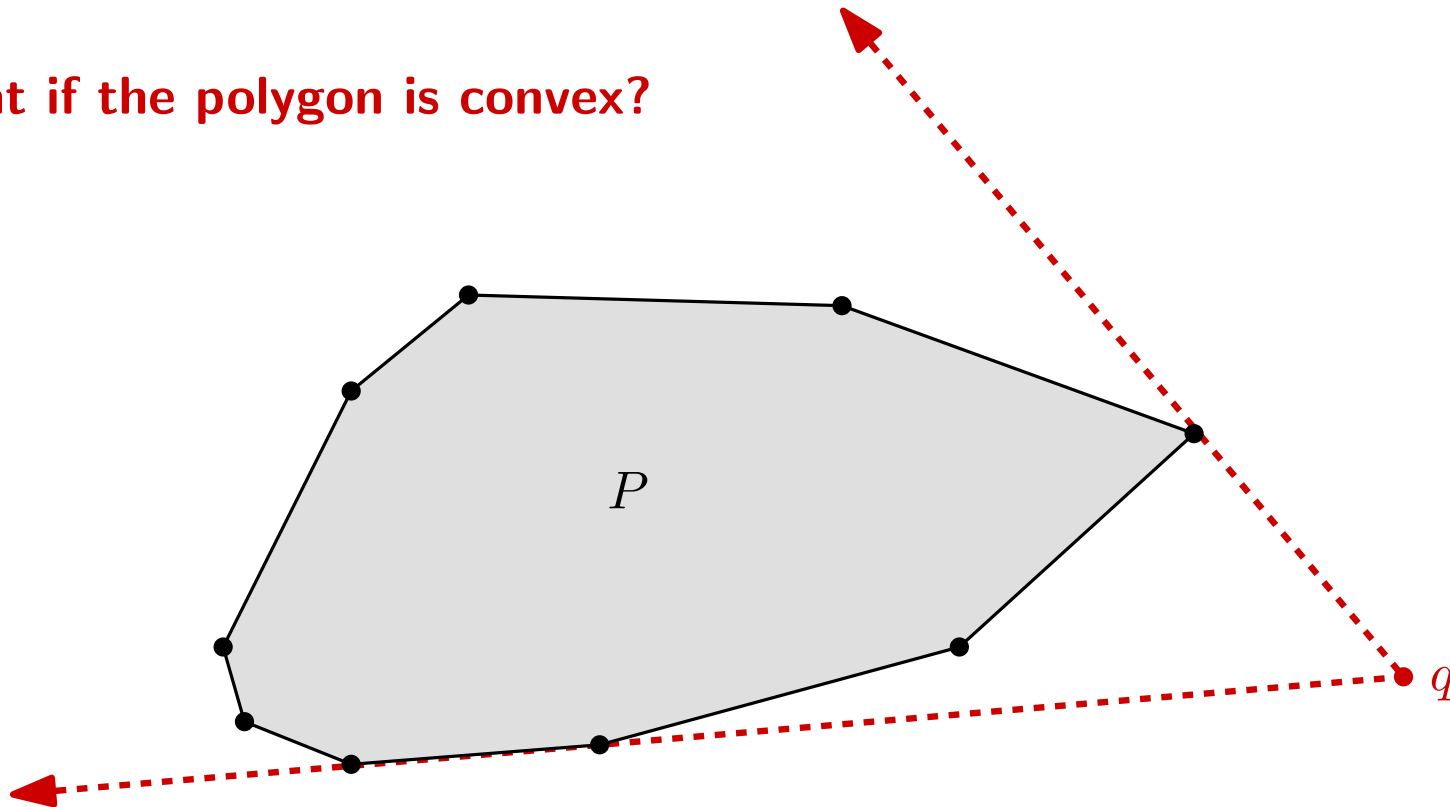
A polygon P with vertices p_1, p_2, \dots, p_n

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FURTHER READING

J. O'Rourke

Computational Geometry in C

Cambridge University Press, 1994 (2nd ed. 1998), pp. 17-35.

F. P. Preparata and M. I. Shamos

Computational Geometry: An Introduction

Springer-Verlag, 1985, pp. 36-45.