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# Line segment intersection

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In [computational geometry](#), the **line segment intersection problem** supplies a list of [line segments](#) in the [Euclidean plane](#) and asks whether any two of them intersect, or cross.

Simple algorithms examine each pair of segments. However, if a large number of possibly intersecting segments are to be checked, this becomes increasingly inefficient since most pairs of segments are not close to one another in a typical input sequence. The most common, more efficient way to solve this problem for a high number of segments is to use a [sweep line algorithm](#), where we imagine a line sliding across the line segments and we track which line segments it intersects at each point in time using a dynamic data structure based on [binary search trees](#). The [Shamos–Hoey algorithm](#)<sup>[1]</sup> applies this principle to solve the line segment intersection detection problem, as stated above, of determining whether or not a set of line segments has an intersection; the [Bentley–Ottmann algorithm](#) works by the same principle to list all intersections in logarithmic time per intersection.

## See also [\[edit\]](#)

- [Line-line intersection](#)

## References [\[edit\]](#)

- ↑ Shamos, M. I.; Hoey, D. (1976). "17th Annual Symposium on Foundations of Computer Science (sfcs 1976)" (PDF). p. 208. doi:10.1109/SFCS.1976.16. |chapter= ignored (help)
- ↑ Mark de Berg, Marc van Kreveld, Mark Overmars, and Otfried Schwarzkopf (2000). *Computational Geometry* (2nd edition ed.). Springer. ISBN 3-540-65620-0. Chapter 2: Line Segment Intersection, pp. 19–44.
- ↑ Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein. *Introduction to Algorithms*, Second Edition. MIT Press and McGraw-Hill, 1990. ISBN 0-262-03293-7. Section 33.2: Determining whether any pair of segments intersects, pp. 934–947.
- ↑ J. L. Bentley and T. Ottmann., Algorithms for reporting and counting geometric intersections, IEEE Trans. Comput. C28 (1979), 643–647.

## External links [\[edit\]](#)

- [Intersections of Lines and Planes](#)  Algorithms and sample code by Dan Sunday
- Robert Pless. [Lecture 4 notes](#) . Washington University in St. Louis, CS 506: Computational Geometry.
- [Line segment intersection](#)  in CGAL, the Computational Geometry Algorithms Library
- "[Line Segment Intersection](#)"  lecture notes by Jeff Erickson.
- [Line-Line Intersection Method With C Code Sample](#)  Darel Rex Finley



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