

# LAB 1: Segment intersection

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The implementation proposed to solve the 2 segment intersection problem classify the intersections in the following cases:

- Point intersection
  - ◆ Interior-Interior point intersection
  - ◆ Endpoint-Endpoint intersection
  - ◆ Endpoint-interior intersection
- Segment intersection
  - ◆ Both segment are the same, full intersection
  - ◆ One segment is a subset of the other, starting at an endpoint
  - ◆ One segment is a subset of the other, from one interior point to another
  - ◆ Partial segment intersection (a part of each segment intersect with each other)

From an implementation perspective, the program solves the intersection in 2 ways, either using a basic orientation test if segments aren't collinear, or in the case of collinearity projecting the segments in an axis (comparing point values in x or y axis to check if they're inside the given segment).

In the non-collinear case, to classify the cases we focus on the '0' values of the determinants, to know if an endpoint is the one intersecting a segment.

In the collinear case, we need to check the segment endpoints positions in the same way explained before (projecting on one axis), we check the endpoints positions and if they coincide with some endpoint of the other segment to analyze the cases proposed.

## Annex (main part of the script):

```
//d1,d2,d3,d4 are the signs of the determinants of each endpoint
with the other segment

var areCollinear = (d1 == 0 && d2 == 0) || (d3 == 0 && d4 == 0);
var collinearIntersection = areCollinear && (isPointInside(s2.from, s1)
|| isPointInside(s2.to, s1));
var nonCollinearIntersection = d1 != d2 && d3 != d4;

if (nonCollinearIntersection) {

    var endpoint_with_s1 = (d1 == 0 || d2 == 0);
    var endpoint_with_s2 = (d3 == 0 || d4 == 0);

    if (!endpoint_with_s1 && !endpoint_with_s2)
        //INTERIOR-INTERIOR POINT
    else if (endpoint_with_s1 && endpoint_with_s2)
        //ENDPOINT-ENDPOINT
    else
        //ENDPOINT-INTERIOR
}
else if (collinearIntersection) {

    if (isSegmentEqual(s1, s2))
        // SAME SEGMENTS
    else if (isSegmentInside(s1,s2) || isSegmentInside(s2,s1)) {
        if (isSharingSomeEndpoint(s1,s2))
            // ONE SUBSET OF THE OTHER (STARTING AT ENDPOINT)
        else
            // ONE SUBSET OF THE OTHER (FROM INTERIOR POINT TO ANOTHER)
    }
    else {
        if (isSharingSomeEndpoint(s1,s2))
            //ENDPOINT-ENDPOINT
        else
            //PARTIAL SEGMENT INTERSECTION
    }
}
else {
    // NO INTERSECTION
}
```