Numerical Geometry: Assignment 1

The purpose of this assignment is to prepare you for the visualization of your project in which you will compute a Delaunay triangulation and implement a graphical display in javascript. This assignment is divided in two parts:

For the first part, you're going to implement a simple intersection algorithm between two segments. You are asked to:

1. Detect the user's clicks for the creation of the segments and display them on a canvas,
2. Compute the intersection of the segments and display it (if it exists).

For the second part, a mesh is provided to you via a `json` file. You are asked to:

3. Display the provided mesh on a canvas,
4. Detect in which triangle a point (corresponding to a mouse click) is located.

There are also bonus tasks that you can complete:

- Display node/triangle numbers, add nodes in the mesh, ...
- Implement interactive zoom and moving around the canvas.
- In degenerate cases the intersection of two line segments is a line segment. Adapt your code to handle this and show it with a hard-coded test case.

Task	Points
Draw segments	4
Intersection computation	5
Display of the mesh	4
Triangle detection	5
Basic visual improvements (colors, rounded nodes, . . .)	2
Bonuses	max 5
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Total	20

Some resources to help you get started

- Canvas tutorial: https://developer.mozilla.org/en-US/docs/Web/API/Canvas_API/Tutorial
- How to write a Markdown file: https://www.markdownguide.org/basic-syntax/

Practical information

- **Groups:** *The groups must be the same for the 2 homeworks and the project*
- **Collaboration:** *You are allowed, and even encouraged, to exchange ideas on how to address this assignment with students from other groups. However, you must do all the writing (report and codes) only with your own*

group; it is strictly forbidden to share the production of your group. Plagiarism will be checked.

- **Writing:** *You write a small Read Me file, preferably in Markdown, explaining what you have done, especially if you went further than asked.*
- **Language:** *All reports and communications are equally accepted in French and English.*
- **Deliverables:** *Each group is asked to submit their project on the course website:*
  - *The readme,*
  - *The .html, .js and .json files.*
- **Deadline:** *The homework is due for Friday, October 6 at 18:15.*
- **Questions:** *You can adress questions by sending an email to the teaching assistants (matteo.couplet@uclouvain.be, antoine.quiriny@uclouvain.be, illy.perl@uclouvain.be). Direct messages on Teams will not be considered*