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PRESENTATION
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DEVELOPMENT OF FUNCTIONS FOR INTERACTIVE EDITING OF GEOMETRY AND BOUNDARY CONDITIONS IN CALFEM
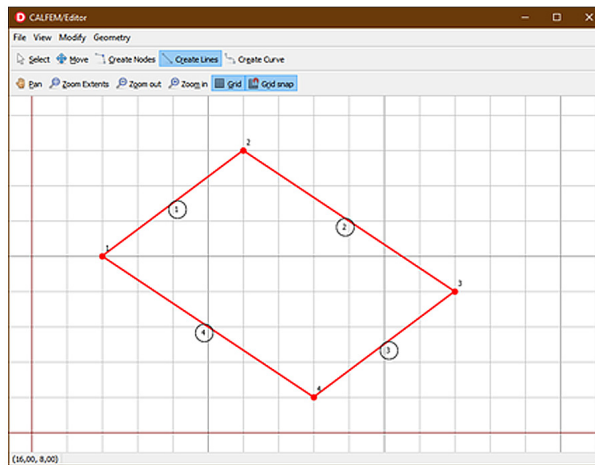

Figure 1 – Example of a similar editor made in Object Pascal (Jonas Lindemann, 2021)

BACKGROUND
CALFEM in Python is a library used in teaching of the Finite Element Method. In the courses students use the library to implement code to solve the exercises and from this produce results and diagrams. As of now, in order to produce a geometry for the problems, all points and connecting lines and surfaces must be manually defined in the code which is both tedious work and limiting to a simple geometry with few points before becoming difficult to handle. Because of this, students may struggle and spend much time working with defining the geometrical points and connections correctly, drawing focus from the other areas of the exercises which may be more crucial for learning of the basics of the Finite Element Method. Hence, for use in the course "Software Development for Technical Applications" and for use in pedagogical examples there is an interest in being able to produce the geometries using a graphical interface and through this more efficiently modify and work interactively with the geometry.

AIM
The aim of this project is to implement functions in the CALFEM for Python toolbox in order to integrate a graphical user interface for creating and modifying geometries. In addition, enabling the use of these functions both within the Python environment and as a stand-alone program with options to export geometries for use in both CALFEM for Python and MATLAB.

METHOD
The project will be initiated with a literature study to research similar functions in other libraries and tools in order to find how an interactive editor can be constructed for both usability and functionality. Following this the graphical editor will be implemented and integrated together with the existing CALFEM for Python source code. During the process, if possible, a user study will be performed using students from an appropriate course to obtain feedback and ideas on how to utilize the tool in an educational setting.