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Question 2

- (a) The pre-processing stage can be considered as the first five steps of the SIMPLE acronym. Firstly, the geometry needs to be split down into finite elements, to create elements and nodes. This is so that mathematical assumptions can be made from one node to the next. As long as these distances are small enough, close approximations can be obtained. During this step, the user will need to consider element type, element order and density.
- Interpret - in order to obtain a result, FEA will always be a trade off between the accuracy of the results and the run time. As a result, the part needs to be idealised during this step. This means small details that add complexity should be removed. Here it is important to control the version of CAD data, ie, parts for FEA and parts for manufacture.
- Material - Once the part has been simplified and meshed, material information should be added. You need to consider if the material is linear or non-linear as this will determine the solver used. Ensuring this information is accurate between physical and virtual is key for accurate results. Also consider material tolerance.
- Physical - The information required at this stage will depend on what type of elements have been used. For 1D elements, area, second moment of area and orientation will be needed whereas for 2D elements then the thickness of the elements has to be