EGR 140 Due date: At the time of the final exam
Statics
File: N140C2B

Computer Programming Assignment #2

The purpose of this assignment is to give the Engineering student practice in using computers and computer software in the solution of Engineering problems. Solving problems using a computer allows us to investigate problems that might be too tedious by hand, particularly when repetitive calculations and graphical results are required.

Software Requirements:

Solve the problem below using Excel, MatLab, or MathCAD (or some other math or spreadsheet software package approved by the instructor). Any version of these programs is acceptable. Both MatLab and Excel are available on campus. Recall that Excel is introduced in EGR 120 and MatLab is introduced in EGR 110, so you could refer to the textbooks for those courses for more information on using the software.

Sample Computer Solutions:

Sample computer solutions using Excel, MatLab, and MathCAD are available on the course website.

Assignment format:

Your solution should be neat, clear, and professional in appearance. As a minimum, it should include (for each problem assigned):

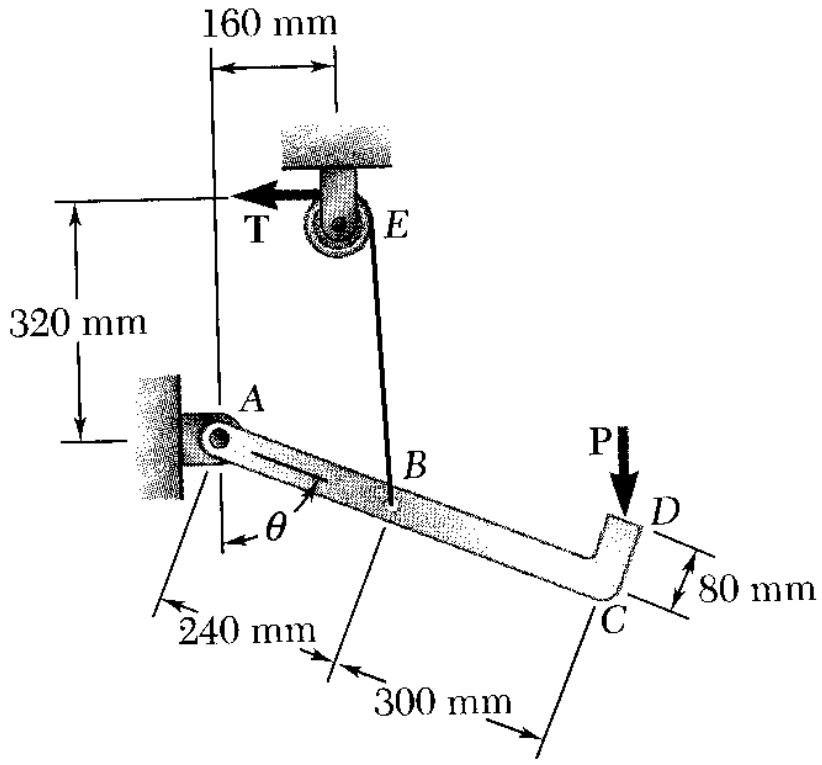
- ***complete statement of the original problem***
- ***free-body diagram***
- ***development of the equations to be solved by the computer***
- ***computer solution, including comments and properly formatted tables and graphs***
- ***final discussion of the results.***

Computer Problem #1: The position of the L-shaped rod shown is controlled by a cable attached at point B. Knowing that the rod supports a load of magnitude P = 200 N, use computational software to calculate and plot the tension T in the cable as a function of θ for values of θ from 0 to 120°. From the table and graph, determine the maximum tension and the corresponding value of θ.

Notes:

- P is always vertical.
- BE is not vertical in general!
- It is a good idea to check you results by working one example by hand (for a specific value of θ in this case).

Reference: Problem 4.C2 in Statics, 7th Ed. , by Beer & Johnston



Computer Problem #2: For the loading shown, determine the force in each member of the truss as a function of the dimension a.

A) Plot the force in each member for 40 in < a < 240 in. Plot tensile forces as positive and compressive forces as negative.

B) If the truss members are for a maximum force of 25 kips (in tension or compression), what is the largest value of a such that this rating is not exceeded?

Notes:

- The 25 kip load is always vertical.
- Use the method of joints to develop your equations.
- It is a good idea to check you results by working one example by hand (for a specific value of a in this case).

Reference: Problem 6.C1 in Statics, 7th Ed. , by Beer & Johnston