

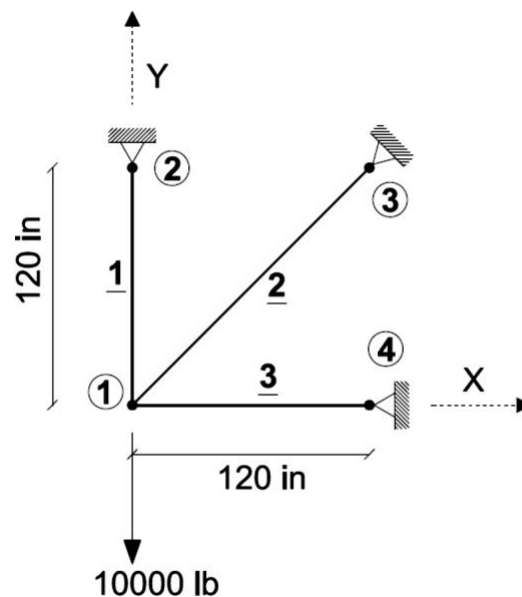
M1. (MATLAB Assignment)

In this question, you will continue working on the simple MATLAB program you started to develop in the previous homework. In this assignment, you will be working on writing data (numerical values and literal text) to the screen (MATLAB Command Window) and a text file with proper formats. In this assignment, you need to use **fprintf** function in MATLAB.

(MATLAB Documentation: <https://www.mathworks.com/help/matlab/ref/fprintf.html>)

In the previous MATLAB assignment, your completed program can read an input file and store the data in particular variables. In this assignment, your program must print the input data stored in the variables into the screen and also into an output file. This is an important task because in the final MATLAB project, your program needs to do the same to display and store analysis results.

Download the skeleton file **hw3.m** and **input.txt** before you begin. The input file includes the data (including geometry, boundary conditions, material properties, and loading) required to define the same planar truss given in the previous assignment with material properties $E = 30 \times 10^6 \text{ psi}$ and $A = 2 \text{ in}^2$ for all elements, and a downward concentrated load applied at node 1.



The skeleton m-file reads the input file and generates the following variables (Previous homework):

- **nNode**: Number of nodes,
- **nElem**: Number of elements,
- **coordinates**: An nNode-by-2 matrix including x and y coordinates,
- **elements**: An nElem-by-2 matrix including the element connectivity data,
- **rx**: An nNode-by-1 matrix (vector) indicates whether a node is free (=1) or restrained (=0) in the x-direction,
- **ry**: An nNode-by-1 matrix (vector) indicates whether a node is free (=1) or restrained (=0) in the y-direction.

- **fx**: An nNode-by-1 matrix (vector) includes the nodal forces component in the x-direction,
- **fy**: An nNode-by-1 matrix (vector) includes the nodal forces component in the y-direction,
- **E**: An nNode-by-1 matrix (vector) includes the Young's modulus of elasticity values, and
- **A**: An nNode-by-1 matrix (vector) includes the cross-sectional area of each element

To accomplish this assignment:

- Use **fprintf** function to display the input data in the following format. You must use the proper **"formatSpec"** parameters to generate a similar look output on the screen with **exactly the same format and number of digits after the decimal point (Integers, Floating-point, and Exponential notations)**.

You are **not allowed to hardcode** any values in your code, except in the formatSpec. Your program must be able to handle any other input file.

```
Command Window

=====
A  S U M M A R Y   O F   T H E   I N P U T   M O D E L
=====
Control Variables:
- Number of Nodes:      4
- Number of Elements:   3
-----

=====
N O D A L       D A T A
=====
Node      Coordinates      Nodal Loads      Restraints
ID         X      Y         Fx      Fy         Rx      Ry
-----
1         0.00    0.00         0.000  -10000.000    1      1
2         0.00   120.00         0.000    0.000    0      0
3        120.00    0.00         0.000    0.000    0      0
4        120.00   120.00         0.000    0.000    0      0
-----

=====
E L E M E N T S   D A T A
=====
Element      Nodes      Material Properties
ID           [1]      [2]           E           A
-----
1             1        2        3.000e+07    2.00000
2             1        3        3.000e+07    2.00000
3             1        4        3.000e+07    2.00000
-----

>>
>>
fx >>
```

- Again, use **fprintf** function to write the same output to a text file named **output.txt**. **You will not get any credit if simply copy the Command Window contents and paste it into a text file!**

Submission:

Upload (i) your completed version of **hw3.m**, and (ii) the generated file **output.txt** to Canvas and **attach** a **hard copy** to your submission in class