MA #5 Guide

Overall Goal: Calculate how much a beam moves in the y-direction (deflection) when a force(s) is applied at a specific location(s).

Task 1: Main Script – Data validation on a menu selection

- Load necessary data
- Create a menu of the materials that the user can use to select a material for the beam.
- Perform data validation if the user exits out of the menu, continue to display the menu again ***until*** a selection is made.
  - HINT: While loop or for loop to repeat a block of code? Keyword: ***until***

Task 2: Write and use a function to obtain a user value and perform data validation

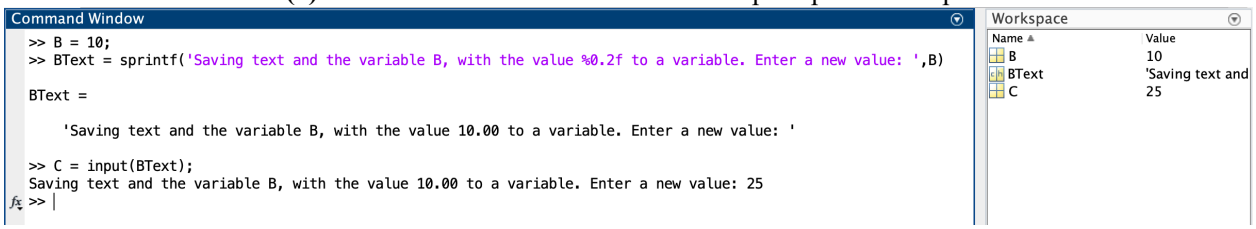
Function: Create a function that mirrors the code working behind the scenes when you use the built-in MATLAB input function. In addition to asking for the user input, your function will perform data validation on the input and only store the value in a variable if it passes.

- Inputs: (1) Text prompt (string or character array) that asks the user to enter a location on the beam
- Outputs: (1) A valid user input
  - HINT: Inside your function you will have to use the built-in input function to actually ask the user your prompt (the ValidInput function input) and store the user-entered value. Then, using the stored value from the built-in input function, perform any necessary data validation before sending the value back to the main script as the output if it passes
  - HINT: While loop or for loop to repeat a block of code? If there is not a predetermined number of times the code will run and it depends on the user entries→while loop

Main Script: Call your function (ValidInput) 3 times to obtain valid user inputs for length, width, and height of the beam.

Task 3: Main Script – Calculate the concentrated force and create a plot

- Prompt the user to enter a concentrated force [F]
- Prompt the user to enter the corresponding force location
  - HINT: The prompt for the force location should include a range of acceptable locations from 0 to the length of the beam the user entered in Task 2.
    - **Helpful function: sprintf** same syntax as fprintf, but the output is saving text to a variable instead of the command window. You can use the variable that contains the text as the input for any function that normally has a text input, examples: axis titles, plot titles, input statements
    - **Example:**
      Note the order:
      (1) The variable B is defined. **(2)** B is included in a formatted text output and saved to the variable BText. **(3)** The variable BText is used as the text prompt for the input function



- Calculate the deflection along the length of the beam using the provided equations and sample calculations. **Final answer is in [mm] pay attention to units!**
  - **HINT:** Because you are calculating the deflection along the entire beam, your x values should be a vector of closely spaced values from 0 to the user-entered length.
- Create a plot with the listed elements

Task 4: Main Script – Determine the overall deflection when more than 1 force is applied

- Prompt the user to enter a **vector** of forces and a separate **vector** of locations that correspond to those forces
- Calculate the deflection for corresponding force and locations
  - HINT: You can apply a for loop to index out each force and location pair to repeat the calculation. How many times do you need to cycle your loop? Once for each pair! *Because you know how many times you must repeat the calculation you use a **for loop**.*
- The total deflection on the beam at a given point is the sum of all the different force deflections
- Create a plot with the listed elements

Task 5: Main Script – Controls to repeat your program

- Create a menu to ask the user if they want to repeat the program starting at Task 4
  - HINT: Is there a predetermined number of times the program will be repeated? If the answer is **NO**, you should be thinking **while loop**