EGR 110 Due Date:_____
Engineering Graphics
File: N110MA6

MATLAB Assignment #6

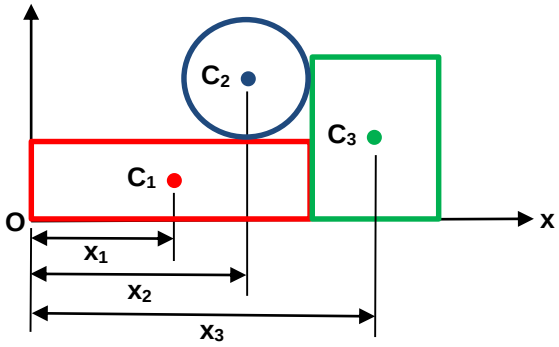
Reading Assignment:
MATLAB Lecture #6
Section 3.6 in MATLAB – An Introduction with Applications, 5th Edition, by Gilat

MATLAB Assignment:

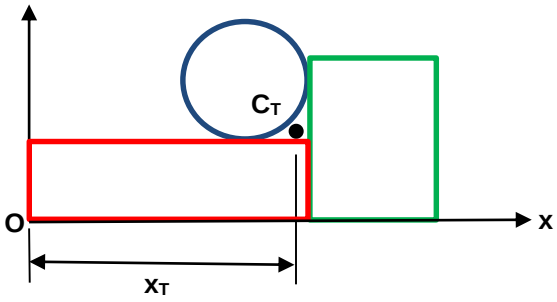
1. (50 points) ***Cable car times***: Student teams competed in a cable car competition and recorded their times to race across a 50 m test cable. The following times were recorded (in seconds):
   8.50, 12.67, 13.50, 9.28, 10.05, 10.67, 10.05, 19.83, 15.44, 17.59, 9.77, 8.88,
   (add 24 more values distributed between 5.00 and 20.00)
   A) Enter the values above into ***Notepad*** in a format so that they can be read into a single column vector or row vector. Save the text file using your last name and the problem number for the file name.
   B) Write a MATLAB program to read the text file and use functions in MATLAB to find and display each of the following (including units). The program should work for a file with any number of values (not just for 36).
      - Average time
      - Median time
      - Mode
      - Standard deviation
      - Number of cable car runs recorded tested
      - Standard deviation
      - Maximum time
      - Minimum time

   C) Display the original times (4 per line) with a descriptive heading
   D) Sort the times from smallest to largest and display them again (4 per line) with a descriptive heading.
   E) Submit a copy of the text file, a copy of the MATLAB program, and a copy of the MATLAB output. All MATLAB programs should begin with a block of comments including name, course, assignment number, problem number, and a brief description of the program. Also include comments throughout the program.

2. (50 points) ***Center of mass***: If the mass and the location of the ***center of mass***, C, (with respect to a common origin) for different parts of an object are known, the center of mass can be easily calculated using a ***weighted average***. Refer to the diagram on the following page for the definitions below:
   - m_i is the mass of part i
   - C_i is the center of mass for part i
   - x_i is the x-coordinate of the center of mass for part i
   - m_T is the mass of the entire object
   - C_T is the center of mass for the entire object
   - x_T is the x-coordinate of the center of mass for the entire object.



Center of mass for each part shown



Center of mass for entire object shown

Example: If the object illustrated above has the following values for x_i and m_i, find the total mass, m_T, and the location of the center of mass, x_T.

Part i	x_i (mm)	mass (g)
1	35	100
2	55	50
3	75	150

$$x_T = \frac{\sum x_i m_i}{\sum m_i} = \frac{x_1 m_1 + x_2 m_2 + x_3 m_3}{m_1 + m_2 + m_3} = \frac{35 \cdot 100 + 55 \cdot 50 + 75 \cdot 150}{100 + 50 + 150} = \frac{17500\ \text{g} \cdot \text{mm}}{300\ \text{g}} = 58.33\ \text{mm}$$

$$m_T = \sum m_i = m_1 + m_2 + m_3 = 100 + 50 + 150 = 300\ \text{g}$$

A) Enter the values below into ***Notepad*** using ***two columns*** so that they can be read into a matrix. Add 9 more sets of similar values (for a total of 12 sets). Save the text file using your last name and the problem number for the file name.

x_i (mm)	mass (g)
35	100
55	50
75	150

B) Write a MATLAB program to read the text file into a matrix and then create separate vectors for x and m from the matrix. The program should work for any number of sets of values (not just 12). The MATLAB program should also find and display each of the following (including units)

- Total mass
- The value of x_T

C) Submit a copy of the text file, a copy of the MATLAB program, and a copy of the MATLAB output. All MATLAB programs should begin with a block of comments including name, course, assignment number, problem number, and a brief description of the program. Also include comments throughout the program.