

Fall 2012 MATLAB Assignment 5

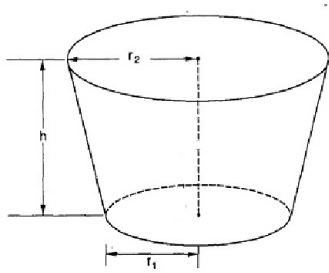
Work the following problems (NOTE: these are RELATED TO the corresponding page and problem number from Gilat. Do NOT work the actual problems from the Lab Manual, or you will receive NO CREDIT!)

NOTE: For problems 1-3, display the values of your variables in a table as demonstrated in the Videos.

1. **g163x01:** A paper cup shaped as a frustrum of a cone with $r_2 = 1.25r_1$ is designed to have a volume of 250 cm^3 . Determine r_1 , r_2 , and the surface area S of the paper cup with heights $h = 5, 6, 7, 8, 9$, and 10 cm. The volume V and surface area of the cup are given by:

$$V = \frac{1}{3}\pi h(r_1^2 + r_1r_2 + r_2^2)$$

$$S = \pi(r_1 + r_2)\sqrt{(r_2 - r_1)^2 + h^2} + \pi r_1^2$$



2. **g164x06:** The velocity v , and the distance d as a function of time, of a car that accelerates from rest at constant acceleration a are given by:

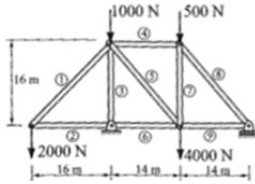
$$v(t) = at \text{ and } d(t) = \frac{1}{2}at^2$$

Determine v and d as every second for the first 10 seconds for a car with acceleration $a = 1.55 \text{ m/s}^2$.

3. **g164x09**: A truss is a structure made of members jointed at their ends. For the truss shown in the figure below, the forces in the nine members are determined by solving the following system of nine equations:

$$\begin{aligned}
 \cos(45^\circ)F_1 + F_2 &= 0 \\
 F_4 + \cos(48.81^\circ)F_5 - \cos(45^\circ)F_1 &= 0 \\
 -\sin(48.81^\circ)F_5 - F_3 - \sin(45^\circ)F_1 &= 1000 \\
 \cos(48.81^\circ)F_8 - F_4 &= 0 \\
 -\sin(48.81^\circ)F_8 - F_7 &= 500 \\
 F_9 - \cos(48.81^\circ)F_5 - F_6 &= 0 \\
 F_7 + \sin(48.81^\circ)F_5 &= 4000 \\
 \sin(48.81^\circ)F_8 &= -1107.14 \\
 -\cos(48.81^\circ)F_8 - F_9 &= 0
 \end{aligned}$$

Write the equations in a matrix form and use MATLAB to determine the forces in the members. A positive force means tensile force and a negative force means compressive force.



4. **g169x26**: The graph of the function $f(x) = ax^4 + bx^3 + cx^2 + dx + e$ passes through the points $(-3, -186)$, $(-1.5, -9.5625)$, $(0.5, 17.4375)$, $(2, 39)$, $(5, -90)$. Determine the constants a , b , c , d , and e , then plot the polynomial and the listed points.
5. Also work **s633x23** from the Stewart text.