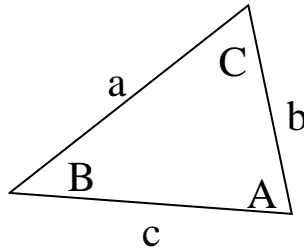# MATLAB Assignment #2

Reading Assignment:
MATLAB Lecture #2
MATLAB Handout

MATLAB Assignment:
1. Write a MATLAB program to calculate the three angles
   in a triangle given the three sides using the law of cosines.

Law of Cosines
$a^2 = b^2 + c^2 - 2 \cdot b \cdot c \cdot \cos(A)$
Example :
If $a = 20$, $b = 15$, $c = 10$, then
$20^2 = 15^2 + 10^2 - 2 \cdot (15) \cdot (10) \cdot \cos(A)$
$A = \cos^{-1}\left(\dfrac{15^2 + 10^2 - 20^2}{2 \cdot (15) \cdot (10)} \right)$
$A = 104.5°$

- Include comments in your program, including name, course, filename, description of the assigned problem, and explanations of program features.
- Display a description of the program
- Prompt the user to enter the three sides of the triangle.
- Display the three sides as well as the three angles in degrees (include the unit ***degrees***).
- Test the program for the following cases:

Case	a	b	c
1	20	15	10
2	5	12	13
3	200	100	250

- Turn in a printout of the program and a printout of the output for the three cases above.

2. Write a MATLAB program to solve N simultaneous equations.
   - Include comments in your program, including name, course, filename, description of the assigned problem, and explanations of program features.
   - Display a description of the program.
   - Display an example so the user will know how to enter the inputs (using brackets, semicolons, etc).
   - Prompt the user to input matrices A and b.
   - Test the program with the following simultaneous equations:

Case	Equations
1	$x_1 + 4x_2 + 7x_3 = 10$ $2x_1 + 9x_2 - x_3 = 15$ $12x_2 + 6x_3 = 20$
2	$3x_1 + 4x_2 = 52$ $2x_1 - 3x_2 = -5$
3	$x_1 + 2x_2 + 3x_3 + 4x_4 + 5x_5 = 30$ $10x_1 + 11x_2 + 12x_3 = 40$ $21x_2 + 22x_3 + 23x_4 = 50$ $x_1 - x_2 + x_3 - x_4 + x_5 = 60$ $9x_1 + 8x_2 + 7x_3 + 6x_4 + 5x_5 = 70$

- Turn in a printout of the program and a printout of the output for the three cases above.

3. Write a MATLAB program to calculate the distance that a mousetrap car will travel. Based on the diagram below, assume that the mousetrap will pull a length of string equal to 2L from the rear axle (axle supports are not shown.)
   - Include comments in your program, including name, course, filename, description of the assigned problem, and explanations of program features.
   - Display a description of the program.
   - Prompt the user to input:
     a. The length of the arm, L (in inches)
     b. The diameter of the axle (in inches)
     c. The diameter of the rear wheel (in inches)
   - Display the three input values (with units) and the distance travelled (in feet).
   - Test the program for the following cases:

Case	L	Axle Diameter	Rear Wheel Diameter
1	12	.125	4.5
2	8	.125	4.5
3	8	.25	4.5
4	8	.125	6

Extension Arm →   String

← L → ← L →   String wrapped around this axle

Chassis   Mousetrap   Drive Wheel