

Engineering Models I
Homework Assignment #10

Problem 1: Consider the following three forces:

$$F_1 = 5\angle 35^\circ \text{ N}; \quad F_2 = 25\angle -125^\circ \text{ N}; \quad F_3 = 60\angle 165^\circ \text{ N}$$

(a) Resolve each force into an x-component and y-component. Fill in the table below. **Show your work!**

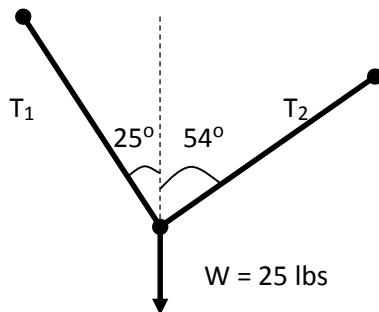
Force	x-component	y-component
F1		
F2		
F3		

(b) Calculate the resultant force in rectangular form and polar form. **Show your work and include units in your answers!**

Resultant Force (Rectangular Form): $F_x =$ _____ $F_y =$ _____

Resultant Force (Polar Form): _____

Problem 2: Write the force balance equations for the diagram shown below that represents a picture hanging from two wires. Then write the equations in matrix form and use MATLAB to solve for the tension (T_1 and T_2) in the two wires. The units for tension (force) will be in pounds (lbs).



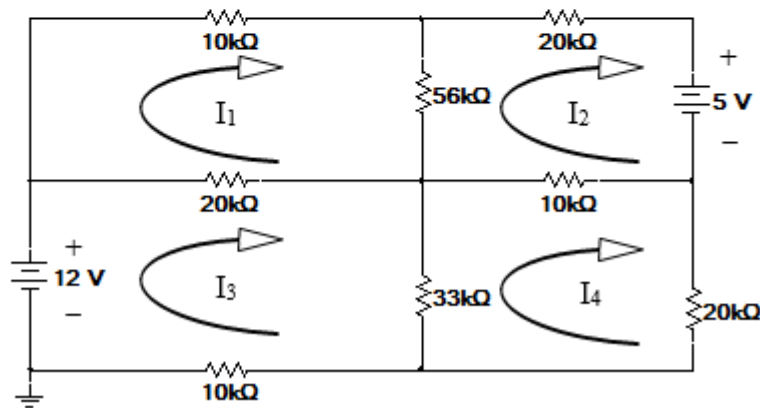
Problem 3: A student in a circuits class writes the following mesh equations for the circuit shown below and now must solve for the unknown currents (I_1 , I_2 , I_3 , and I_4).

$$(10)I_1 + (56)(I_1 - I_2) + (20)(I_1 - I_3) = 0$$

$$(20)I_2 + 56(I_2 - I_1) + (10)(I_2 - I_4) = -5$$

$$(20)(I_3 - I_1) + (33)(I_3 - I_4) + 10I_3 = 12$$

$$33(I_4 - I_3) + 10(I_4 - I_2) + (20)I_4 = 0$$



- Write the equations in matrix form and use MATLAB to solve for all four currents. The units for the currents will be in milliamps (mA). **Show all of your MATLAB commands and results.**
- Find the current through the 56 kΩ resistor and find the voltage drop across the 56 kΩ resistor. **Show your calculations and include units in your answers.**