EE 313
Example Power Problem

A source, V_S = 150 Vrms, operating at 60 Hz is connected to three loads, all of which are connected in parallel. The details of the loads are given below. Answer the following questions about this power system.

Z_1: P_1 = 25 kW with PF_1=0.5 lagging
Z_2: P_2 = 18 kW and Q_2=-12 kVAR
Z_3: I_3=60 Arms and PF_3 = 0.75 lagging

    a) What is the impedance of each load?
    b) What is the phasor current flowing through each load?
    c) What is the real power delivered by the source?
    d) What is the complex power absorbed by each load?
    e) What is the power factor of the combined loads?
    f) What is the magnitude of the source current?
    g) If a corrective load is added to minimize the source current magnitude, what would this magnitude be?
    h) Design a corrective load to make the combined power factor equal to 0.952 lagging. What is the impedance of this load? What is the element value of this new load? What is the magnitude of the source current now?