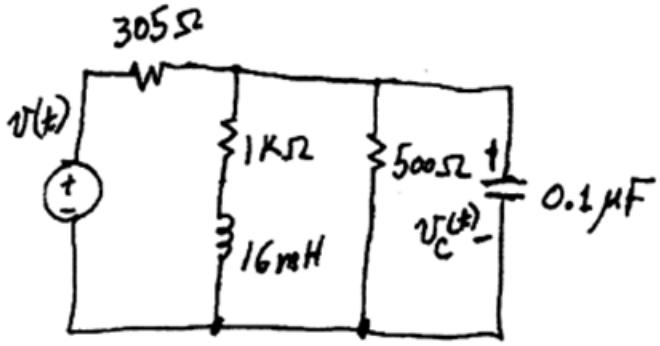
**EECE499 HOMEWORK #5**
Due: (W) March 16

**Phasor Analysis**

1. Find the voltage $v_c(t)$ by steady-state analysis, where $v(t) = \cos(2\pi f t + 45°)$ [$V$] with $f = 10^4$ [Hz].



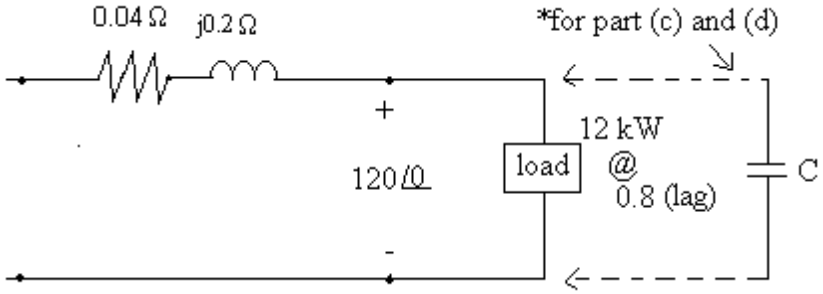

**Single-Phase Problems**

2. In a computer center, there are three single-phase computer devices (description listed below) installed in parallel. The magnitude of the voltage of each device is 208 [V].

Disk: 6.157 kVA at pf = 0.79 lag
Drum: 16.93 kW at pf = 0.96 lag
CPU: 22.694 kW while the magnitude of the current through the CPU = 127 [A]

Find the power factor of the combined computer device (i.e., *pf* of the computer center).

3. A load on a 60-Hz system requires 12kW at 0.8 pf lagging when operated at 120V. The impedance of the feeder supplying the load is 0.04+j0.2 Ω. (See circuit below)
(a) What is the magnitude of the voltage at the source?
(b) What is the power loss in the feeder line?
(c) To improve the pf of the load to 0.96 (lagging), what size capacitor (in microfarads) at the load end is needed?
(d) After the capacitor is installed, what is the magnitude of the voltage at the source, if the load voltage is maintained at 120 V ?




**Three-Phase Problem**

4. A three-phase line has an impedance of 0.8 + j 2.4 Ω each phase. The line feeds two balanced three-phase loads that are connected in parallel. The first load is absorbing a total of 144 kW and 108kVar. The second load is Δ-connected and has an impedance of 144 – j 42 Ω each phase. The line-to-neutral voltage at the load end of the line is 2400 V. What is the magnitude of the *line voltage* at the source end of the line?