ECE 301
Fall Semester, 2005
HW #6

wlg   Name _____
Due: Nov 29   Print (last, first)

Use engineering paper. Work only on one side of the paper. Use this sheet as your cover sheet, placed on top of your work and stapled in the top left-hand corner. Number the problems at the top of the page, in the center of the sheet. **Do neat work. Underline your answers. Show how you got your equations**. **Be sure to show how you got your answers.** Each problem counts 15 points.

(1) You are given the circuit of Figure 1.
    (a) If the phasor current $\mathbf{I_{ad}} = 0.5\angle 0$ A, find the phasor current $\mathbf{I_{ca}}$. Ans: $0.236\angle\text{-}45^o$ A.
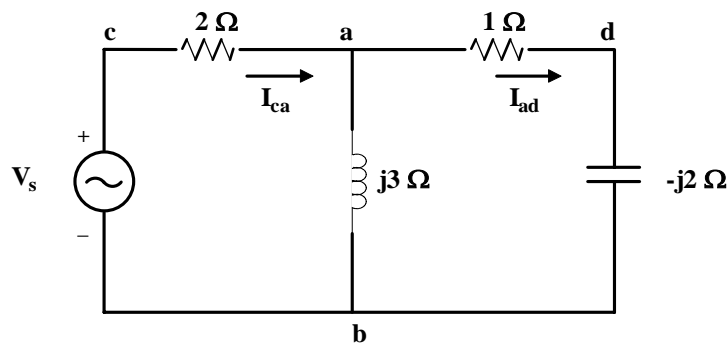   (b) Find the phasor source voltage, $\mathbf{V_s}$. $1.57\angle\text{-}58^o$ V.

Figure 1: Circuit for problems 1 and 2.

(2) Find the impedance seen by the source voltage (Z_{cb}) of Figure 1. Ans: Verify by using $\mathbf{V_s}$ and $\mathbf{I_{ca}}$ of problem 1.

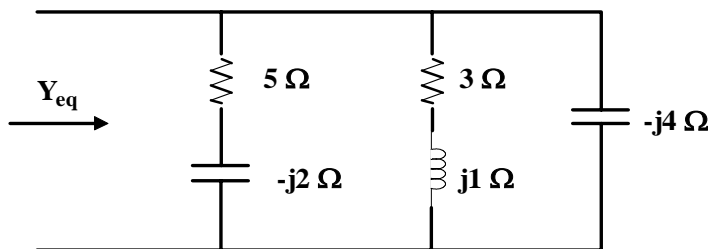(3) Determine Y_{eq} for the circuit of Figure 3. Ans: $0.521\angle 24.9^o$ S

Figure 3: Circuit for problem 3.

(4)   Given the circuit of Figure 4. Use mesh analysis to find the phasor currents I_1 and I_2.
       Ans: $I_1 = 0.27\angle15.8$ A, $I_2 = 2.09\angle152.9$ A.

-j40 Ω
10 Ω
j20 Ω
25 Ω
+
I_1 I_2
60cos(100t+30°) V
15 Ω
+
90sin(100t+40°) V
−
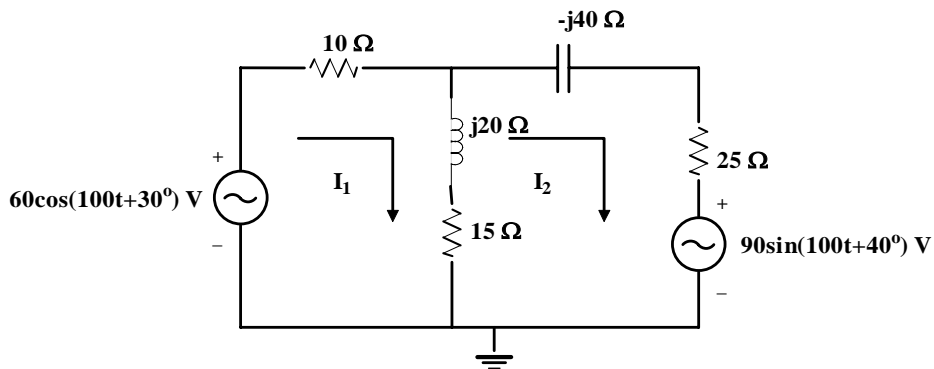
Figure 4: Circuit for problem 4.

(5) You are given the circuit of Figure 6. Find V_o using nodal analysis. Ans $V_o = 4.04\angle70.35°$ V

j2 Ω
12∠0 V
4 Ω
+   −
+
2 Ω V_o -j4 Ω   -0.2 V_o
−
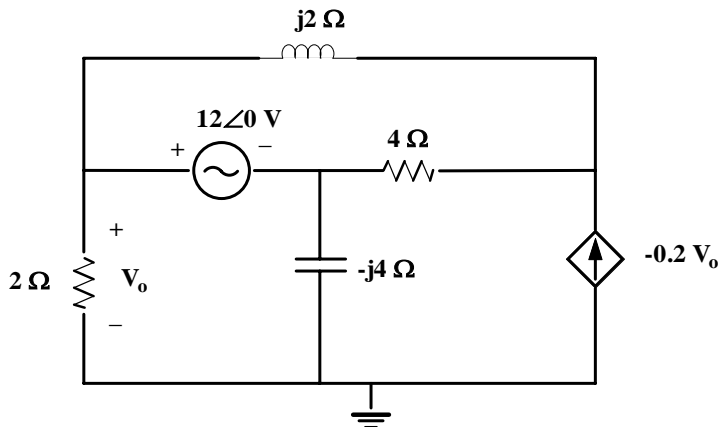
Figure 5: Circuit for problem 5.

(6) Find the Thevenin equivalent circuit to the left of a-b of Figure 6. Ans: $V_{TH} = -50\angle30°$ V
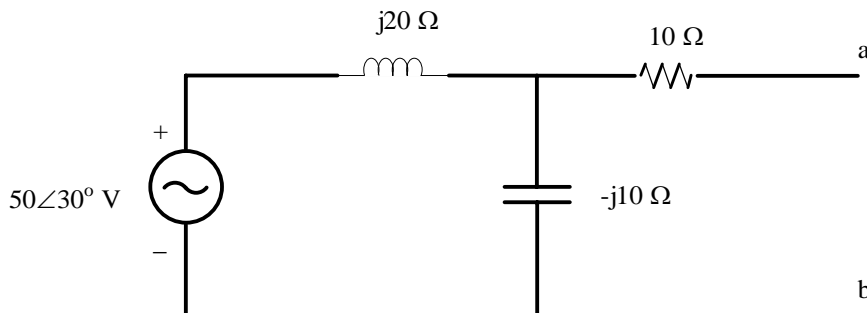 $Z_{TH} = (10 - j20)$ Ω

j20 Ω
10 Ω
a
+
50∠30° V
-j10 Ω
−
b

Figure 6: Circuit for problem 6.