**Homework 8**

**P8.1.6** Given **A** = 3 + *j*5, **B** = 10 – *j*8, and **C** = *j*12. Determine the phasors resulting from the following operations: (a) **A**\***B**\***C**; (b) (**A**\***B**)/**C**; (c) (**A**/**B**)\***C**; and (d) **A**/**B**/**C**. Express the result in rectangular and polar forms.

**Solution:** Using Matlab:

A=3+*j*5, B=10–*j*8, C=*j*12.

1. a=A\*B\*C gives -312 + *j*840.

[tha,ra]=cart2pol(real(a),imag(a)) gives 1.9264, 896.1 ≡ 896.1∠110.4°.

1. b=(A\*B)/C gives 2.1667 – *j*5.8333.

[thb,rb]=cart2pol(real(b),imag(b)) gives –1.2152, 6.223 ≡ 6.223∠-69.62°.

1. c=(A/B)\*C gives -5.4146 – *j*0.7317.

[thc,rc]=cart2pol(real(c),imag(c)) gives –3.0073, 5.464 ≡ 6.223∠-172.3°.

1. d=(A/B)/C gives 0.0376 + *j*0.0051.

[thd,rd]=cart2pol(real(d),imag(d)) gives 0.1343, 0.0379 ≡ 0.0379∠7.69°.

**P8.2.5** Determine **Vx** and **IL** in Figure P8.2.5 and the total power dissipated in the circuit, assuming the supply frequency is 



**Solution:** *ωL* = 103 × 50 ×10-3 = 50 Ω;  = 40 Ω; = ; **Vx** V; **IL**0.2 A. Power dissipated in 10 Ω resistor is  = 0.2 W. |***V*x**| = 2; power dissipated in 40 Ω resistor is = 1.3 W. Total power dissipated is 1.5 W.

**P8.3.8** From KVL, the voltage across the capacitor is 6 V and the current is *j*2 A as shown. It follows from KCL that **Ix** = *j*2 + *j* = *j*3 A.



**P8.3.10** Determine *Z* in

Figure P8.3.10.

**Solution:** 





(3 – *j*4) A.

(6 – *j*8) A.

**IZ** = **IS** – **IL** = (3 – *j*4) – (6 – *j*8) = (-3 + *j*4) A; **IC** = **ISRC** + **IZ** = 20 + *j*30 – 3 + *j*4 = (17 + *j*34) A; **VC** = (17 + *j*34)×(-*j*10) = (340 – *j*170) V; **VZ** = (40 + *j*30) – (340 – *j*170) =

(-300 + *j*200) V; (68 + *j*24) Ω.

**P8.3.12** Determine **Vab** in Figure P8.3.12, assuming all impedances are in ohms.



**Solution:** From KCL, the current in the *j*50 Ω inductor is (10 + *j*15) A, and current in the *j*10 Ω inductor is zero. Transforming the Δ-connected capacitors to a Y-connection, the reactance of the capacitor connected to the *j*50 Ω inductor is Ω. It follows that **Vab** = (10 + *j*15)(*j*50 – *j*0.6) = (10 + *j*15)(*j*49.4) = (-741 + *j*494) V.