

Homework 5
Due: Friday, March 2nd, 2023 by 7PM.

Note: In order to receive full credit, you must show your work and carefully justify your answers. The correct answer without any work will receive little or no credit.

1. Find the phasor form of the following functions:

A. $v(t) = 155 \cos(377t - 25^\circ) \text{ V}$

B. $v(t) = 5 \sin(1000t - 40^\circ) \text{ V}$

C. $i(t) = 10 \cos(10t + 63^\circ) + 15 \cos(10t - 42^\circ) \text{ A}$

D. $i(t) = 460 \cos(500\pi t - 25^\circ) - 220 \sin(500\pi t + 15^\circ) \text{ A}$

A. $155e^{-25j}$

B. $5 \sin(1000t - 130^\circ) = 5e^{-130j}$

C. $10e^{63j} + 15e^{-42j}$

D. $-220 \cos(500\pi t - 75^\circ) \rightarrow 460e^{-25j} - 220e^{-75j}$

2. Determine the instantaneous time functions corresponding to the following phasors:

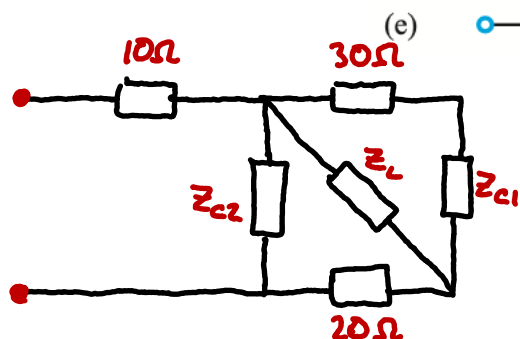
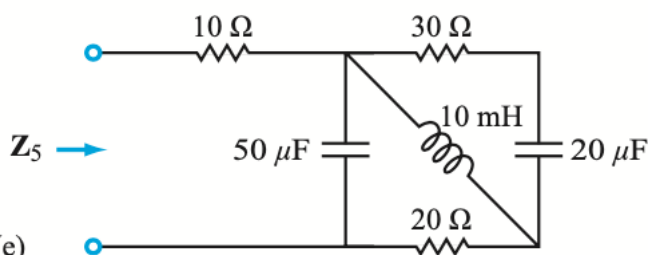
A. $I_1 = 6 \angle 60^\circ \text{ A}$ at $f = 60 \text{ Hz}$

B. $V_1 = -2 \angle -30^\circ \text{ V}$ at $f = 1 \text{ kHz}$

C. $I_2 = j3 \text{ A}$ at $f = 1 \text{ MHz}$

D. $V_2 = -(3 + j4) \text{ V}$ at $f = 10 \text{ kHz}$

3. Determine the equivalent impedance Z_5 . Assume $\omega = 400$ rad/s.

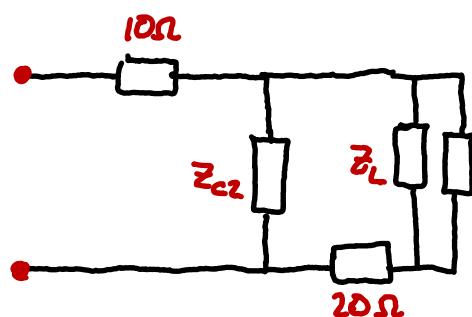


$$Z_{c1} = \frac{1}{j(400)(20 \times 10^{-6})} = 0.008j$$

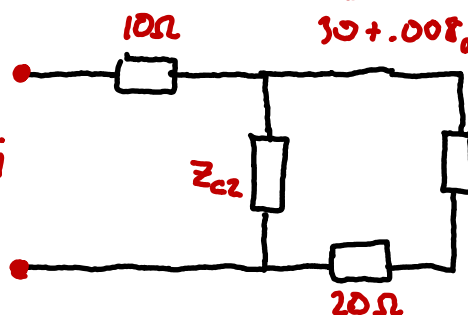
$$Z_{c2} = \frac{1}{j(400)(50 \times 10^{-6})} = 0.02j$$

$$Z_L = j(400)(10 \times 10^{-3}) = 4j$$

$$\frac{(30 + 0.008j)(4j)}{30 + 0.008j + 4j} =$$



$$30 + 0.008j$$



$$30 + 0.008j$$