

1. (20 points)

Evaluate the following:

a.
$$\left[\frac{\cos 60^\circ e^{(2-j2)16}}{20} \right]^* =$$

e.
$$\mathbf{P}[5 \sin(2\pi 10^5 t - 20^\circ)] =$$

b. The polar form of $\frac{(2 + j1.5)}{4 e^{j45^\circ}} =$

f.
$$\mathbf{P}^{-1} \left[\frac{5 e^{j45^\circ}}{(3 + j4)} \right] =$$

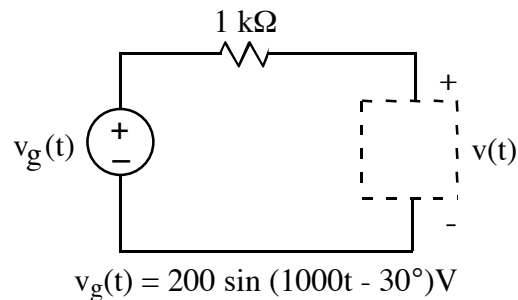
c. The rectangular form of $\frac{16 e^{j30^\circ}}{4 e^{j45^\circ}} =$

g. Absolute magnitude of $\left[\frac{3 e^{j\frac{\pi}{2}}}{5 - j12} \right]$

d.
$$\operatorname{Re} \left[\frac{j3(6 - j7)}{e^{j30^\circ}} \right] =$$

h. Rationalize $\frac{(5 - j4)}{(1 - j)}$

2. (30 points)

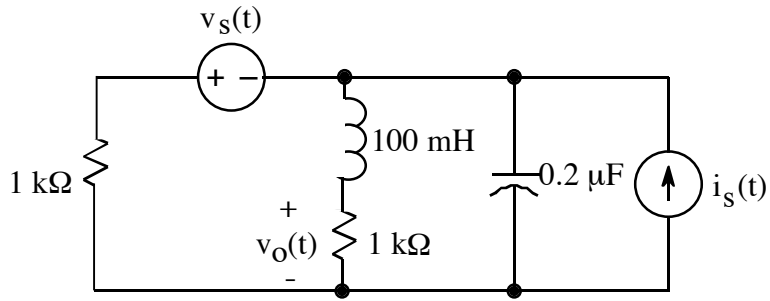


Choose an R, an L, or a C to be placed in the dashed-line box to make

$$v(t) = V_n \sin(1000t) \text{V}$$

where V_n is a real constant. State the value of the component you choose. With your component in the circuit, calculate the resulting value of V_n .

3. (25 points)

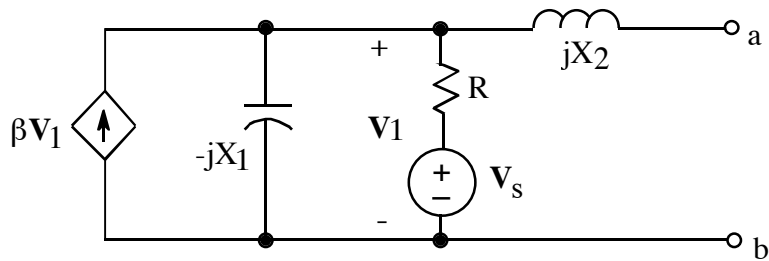


$$v_s(t) = 100 \cos(10^4 t) \text{ V}$$

$$i_s(t) = \sin(10^4 t) \text{ A}$$

- Find a numerical, time-domain expression for $v_o(t)$.
- Show \mathbf{V}_o on a phasor diagram.

4. (25 points)



Construct a frequency-domain Thevenin's equivalent circuit at the terminals a-b.