PRACTICE EXAM

1. Find the value of each of the following:

a) $\left[\dfrac{\cos(60°)e^{2-j2}\cdot 16}{20}\right]^*$

b) Polar form of $\dfrac{2+j1.5}{4e^{j45°}}$

c) Rectangular form of $\dfrac{16e^{j30°}}{4e^{j45°}}$

d) $\text{Re}\left[\dfrac{j3(6-j7)}{e^{j30°}}\right]$

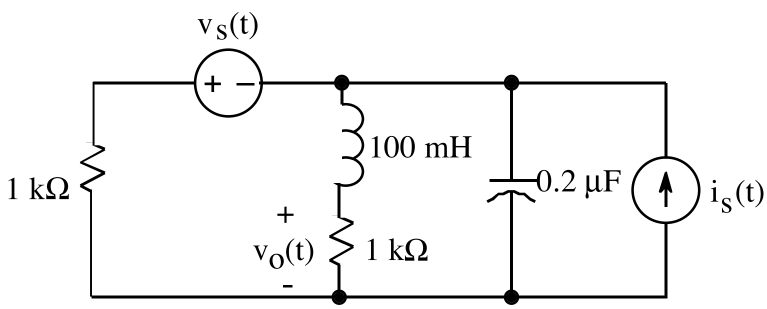
e) $\mathbf{P}[5\sin(2\pi 100\text{k}t - 20°)]$

f) $\mathbf{P}^{-1}\left[\dfrac{5e^{j45°}}{3+j4}\right]$

g) $\left|\dfrac{3e^{j\frac{\pi}{2}}}{5-j12}\right|$

h) Rationalized value of $\dfrac{5-j4}{1-j}$

2.



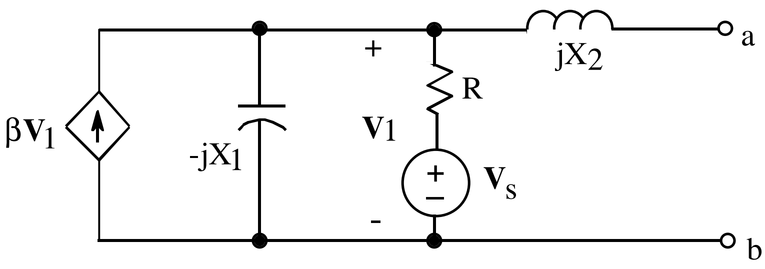
$v_s(t) = 100\cos(10^4 t)$ V

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

a) Find a numerical, time-domain expression for $v_o(t)$.

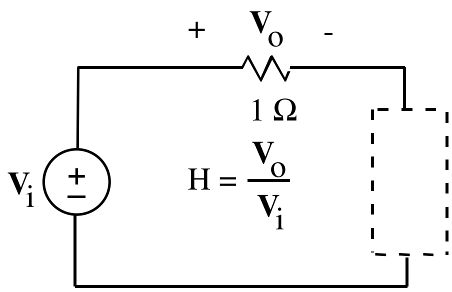
b) Show $\mathbf{V}_o$ on a phasor diagram.

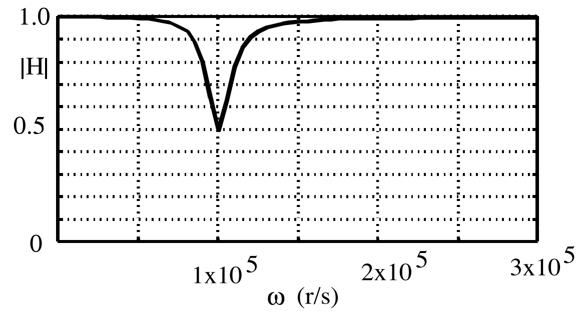
3.



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

4.





Using not more than one each R, L, and C, design a circuit to go in the dashed-line box that will produce the $|H|$ vs. ω shown above, that is:

$|H| = 0.5$ at $\omega = 100\text{k}$ r/s

$|H| = 1$ at $\omega = 0$

$|H| \rightarrow 1$ as $\omega \rightarrow \infty$

Specify values of R, L, and C, and show how they would be connected in the circuit. Note that a bandwidth is not specified, and you do not have to satisfy any more than the three requirements specified above.