Problem Set 6

Problem 1. Determine the phasors corresponding to the following signals.

a) $u(t) = 10\sin(\omega t)\text{V}$

b) $i(t) = 10\cos(\omega t + \frac{\pi}{3})\text{mA}$

c) $u(t) = 5\sin(\omega t + 60°)\text{V}$

d) $u(t) = 2\text{V}\sin(\omega t - 30°) + 3\text{V}\cos\omega t$

e) $i(t) = 12\cos(\omega t - 12°)\text{A}$

Problem 2. Determine alternating signals corresponding to the following phasors.

a) $I = \text{jA}$

b) $I = 6 - \text{j}8\text{A}$

c) $I = -6 - \text{j}8\text{A}$

d) $I = 12\text{e}^{\text{j}10^{\circ}}\text{A}$

e) $U = \frac{1}{\text{j}+1}\text{V}$

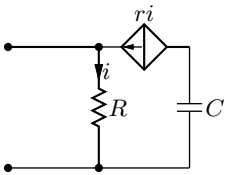
f) $U = \text{j}^{5}\text{V}$

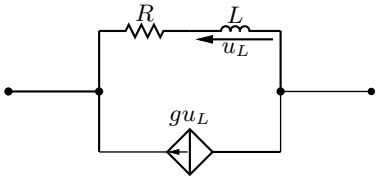
g) $U = \frac{1+\text{j}}{1-\text{j}}\text{V}$

h) $U = 4\text{e}^{\text{j}40^{\circ}}2\text{e}^{\text{j}5^{\circ}}\text{V}$

Problem 3. The voltage across a one-port, and the current through this one-port (oriented opposite with respect to the voltage) equal, respectively, $u(t) = 200\sin(\omega t + 80°)\text{V}$ and $i(t) = 10\sin(\omega t + 20°)\text{A}$. Find the impedance of this one-port.

Problem 4. Find the equivalent impedances of the following one-ports.





Problem 5. Determine current $i(t)$ in the following circuit.
$e(t) = -6\,\mathrm{V}\sin\omega t$, $j_1(t) = 12\,\mathrm{mA}\cos\omega t$, $R_1 = 2\,\mathrm{k\Omega}$, $R_2 = 1\,\mathrm{k\Omega}$, $L = 12\,\mathrm{mH}$, $C = 1\,\mathrm{nF}$, $\omega = \frac{1}{3}\mathrm{Mrad/s}$.