P2.01. $i = -1 \times \frac{\frac{1}{20}}{\frac{1}{20}+\frac{1}{50}} + \frac{100}{20+50} = -0.714 + 1.43 = 0.714\ A$

P2.20. $V_T = 10 \times \frac{3}{3+10} + 3 \times \frac{10}{3+10} = 4.62V$

$R_{eq} = 4 + 10//3 = 6.31\ \Omega$

so $\frac{4.62}{6.31+R} = 0.5 \Rightarrow R = \frac{4.62}{0.5} - 6.31 = 2.92\ \Omega$

P2.55 Use nodes at middle as reference node

$$\frac{v_a - (0)}{40} + \frac{v_a - 50 - (0)}{30} = +4 - 2 \Rightarrow v_a = 62.9\ V$$

$$\frac{v_b - (0)}{20} + \frac{v_b + 80 - (0)}{10} = +2 - 4 \Rightarrow v_b = -66.7\ V$$

$$v_{ab} = v_a - v_b = +129.5$$

P4.17. Use nodal analysis to form DE

$$\frac{v(t)}{80} + i_L(0) + \frac{1}{0.15}\int_0^t v(t')dt' = 0.8\cos(1000t - 20°)$$

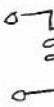
$$\frac{1}{80}\frac{d}{dt}v(t) + 0 + \frac{v(t)}{0.15} = 0.8\frac{d}{dt}\cos(1000t - 20°)$$

$$\downarrow$$

$$j\frac{1000}{80}\underline{V} + \frac{\underline{V}}{0.15} = 0.8 \times j1000 \times 1\angle -20° \Rightarrow \underline{V} = 56.5\angle 8.07°\ V$$

$$v(t) = 56.5\cos(1000t + 8.07°)\ V$$

P 4.24

	symbol	time domain	Freq.	$\underline{Z}$	$\underline{Z}$
Resistor		$v = Ri$	$\underline{V} = R\underline{I}$	$R + j0$	$R\angle 0°$
capacitor		$i = C\frac{dv}{dt}$	$\underline{I} = j\omega C\underline{V}$	$0 - j\frac{1}{\omega C}$	$\frac{1}{\omega C}\angle -90°$
Inductor		$v = L\frac{di}{dt}$	$\underline{V} = j\omega L\underline{I}$	$0 + j\omega L$	$\omega L\angle +90°$

P 4.23 (a) $\underline{Z} = 2\pi(5)(5)\angle 90° = 157\angle 90°\ \Omega$

(b) $\underline{Z}_{RC} = 20\angle -32° = 17 - j10.6 = R - j\frac{1}{4000\pi C}$

$R = 17\ \Omega \qquad C = 7.51\ \mu F$

P 4.23 (c) $Z_{R\|C} = 20\angle -32°$ so $Y_{R\|C} = \frac{1}{20\angle -32°}$

$= \underbrace{0.0424}_{1/R} + j\underbrace{0.0256}_{\omega C}$

$R = 23.6\ \Omega$, $C = 2.11\ \mu F$

P 4.27 $\underline{Z} = 10 + -j10 \| j25 = 10 - j16.7 = 19.4\angle -59.0°$

P 4.30 (a) This is same circuit as 4.28(a)

(b) $\underline{Z}_{in} = 2.4 + j14.8\ \Omega$

(c) $\underline{I} = \frac{10\angle 0°}{2.4 + j14.8} = 0.667\angle -80.8°$

(d) $i(t) = 0.667\cos(1000t - 80.8°)\ A$