

MathCAD Solution to Example 2.7

$$V_{in} = 5 \cos(3000t + \pi/2) \text{ V}$$

$$V_{in} := 5 \cdot e^{i \cdot \frac{\pi}{2}} \quad V_{in} = 5i \quad |V_{in}| = 5 \quad \arg(V_{in}) = 90 \text{ deg}$$

$$\omega := 3000 \quad R_1 := 1000 \quad R_2 := 3000 \quad L := 0.5 \quad C := 0.2 \cdot 10^{-6}$$

$$Z_L := i \cdot \omega \cdot L \quad Z_C := \frac{1}{i \cdot \omega \cdot C}$$
$$Z_L = 1.5i \times 10^3 \quad Z_C = -1.667i \times 10^3$$

$$Z_{eq} := R_1 + \frac{(R_2 + Z_L) \cdot Z_C}{(R_2 + Z_L) + Z_C} \quad |Z_{eq}| = 2.512 \times 10^3$$
$$Z_{eq} = 1.923 \times 10^3 - 1.615i \times 10^3 \quad \arg(Z_{eq}) = -40.03 \text{ deg}$$

$$I_1 := \frac{V_{in}}{Z_{eq}} \quad I_1 = -1.28 \times 10^{-3} + 1.524i \times 10^{-3}$$
$$|I_1| = 1.991 \times 10^{-3} \quad \arg(I_1) = 130.03 \text{ deg}$$

$$I := \frac{(R_2 + Z_L)}{(R_2 + Z_L) + Z_C} \cdot I_1 \quad I = -2.085 \times 10^{-3} + 7.683i \times 10^{-4}$$
$$|I| = 2.222 \times 10^{-3} \quad \arg(I) = 159.775 \text{ deg}$$
$$\arg(I) = 2.789$$

$$I(t) = 2.2 \cos(3000t + 2.789) \text{ mA}$$