

MathCAD Solution to Example 2.7

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

$$V_{in} := 5 \angle \frac{\pi}{2} = 5i \quad |V_{in}| = 5 \quad \arg(V_{in}) = 90^\circ$$

$$\omega := 3000$$

$$R_1 := 1000$$

$$R_2 := 3000$$

$$L := 0.5$$

$$C := 0.2 \cdot 10^{-6}$$

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

$$Z_{eq} := R_1 + \frac{(R_2 + Z_L) \cdot Z_C}{(R_2 + Z_L) + Z_C} = 1.923 \cdot 10^3 - 1.615i \cdot 10^3$$

$$|Z_{eq}| = 2.512 \cdot 10^3 \quad \arg(Z_{eq}) = -40.03 \text{ deg}$$

$$I_1 := \frac{V_{in}}{Z_{eq}} = -0.001 + 0.002i$$

$$|I_1| = 0.002 \quad \arg(I_1) = 130.03 \text{ deg}$$

$$I := \frac{(R_2 + Z_L)}{(R_2 + Z_L) + Z_C} \cdot I_1 = -0.002 + 7.683i \cdot 10^{-4}$$

$$|I| = 0.002 \quad \arg(I) = 159.775 \text{ deg}$$

$$\arg(I) = 2.789$$

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