Chapter 1 - Introduction

Problem 1.1

$pi := 4\,atan(1)$ $\quad pi = 3.142$

$I_p := 100$ $\quad T_o := 8.3 \cdot 10^{-3}$ $\quad T := 16.67 \cdot 10^{-3}$

$I_{RMS} := \frac{I_p}{\sqrt{2}}$ $\quad I_{RMS} = 70.711$

$I_{AVG} := 2 \cdot \frac{I_p}{pi}$ $\quad I_{AVG} = 63.662$

Problem 1.2

$I_p := 100$ $\quad k := 0.5$ $\quad T := 16.67 \cdot 10^{-3}$

$I_{RMS} := I_p \cdot \sqrt{\frac{k}{2}}$ $\quad I_{RMS} = 50$

$I_{AVG} := \frac{I_p}{pi}$ $\quad I_{AVG} = 31.831$

$t_1 := 0$ $\quad t_1 = 0$

$t_2 := \frac{T}{2}$ $\quad t_2 = 8.335 \times 10^{-3}$

$T_o := k \cdot T$ $\quad T_o = 8.335 \times 10^{-3}$

$\theta_1 := 2 \cdot pi \cdot \frac{t_1}{T}$ $\quad \theta_1 = 0$

$\theta_2 := 2 \cdot pi \cdot \frac{t_2}{T}$ $\quad \theta_2 = 3.142$

$I_{AVG} := \frac{I_p}{2 \cdot pi} \cdot \int_{\theta_1}^{\theta_2} \sin(x)\,dx$ $\quad I_{AVG} = 31.831$

Problem 1.3

$I_p := 100$ $k := 0.8$ $T := 16.67 \cdot 10^{-3}$

$t_1 := T \cdot (1 - k)$ $t_1 = 3.334 \times 10^{-3}$

$t_2 := \frac{T}{2}$ $t_2 = 8.335 \times 10^{-3}$

$T_o := k \cdot T$ $T_o = 0.013$

$I_{RMS} := I_p \cdot \sqrt{\frac{k}{2} + \frac{\sin\left[T_o \cdot (1 - k)\right] \cos[pi \cdot (1 - k)]}{2 \cdot pi}}$ $I_{RMS} = 63.273$

$\theta_1 := 2 \cdot pi \cdot \frac{t_1}{T}$ $\theta_1 = 1.257$

$\theta_2 := 2 \cdot pi \cdot \frac{t_2}{T}$ $\theta_2 = 3.142$

$I_{AVG} := \frac{I_p}{2 \cdot pi} \cdot \int_{\theta_1}^{\theta_2} \sin(x)\, dx$ $I_{AVG} = 20.834$

Problem 1.4

$I_p := 100$ $k := 0.4$ $T := 1 \cdot 10^{-3}$

$T_o := k \cdot T$ $T_o = 4 \times 10^{-4}$

$I_{RMS} := I_p \cdot \sqrt{k}$ $I_{RMS} = 63.246$

$I_{AVG} := I_p \cdot k$ $I_{AVG} = 40$

Problem 1.5

$I_a := 80$ $I_b := 100$ $k := 0.4$ $T := 1 \cdot 10^{-3}$

$T_o := k \cdot T$ $T_o = 4 \times 10^{-4}$

$$I_{RMS} := \sqrt{k \cdot \frac{\left(I_b^{\,2} + I_a \cdot I_b + I_a^{\,2}\right)}{3}} \qquad I_{RMS} = 57.038$$

$$I_{AVG} := k \cdot I_a + \frac{\frac{1}{2} \cdot k \cdot T \cdot \left(I_b - I_a\right)}{T} \qquad I_{AVG} = 36$$

Problem 1.6

$I_p := 100$ $\quad k := 0.4$ $\quad T := 1 \cdot 10^{-3}$

$T_o := k \cdot T \qquad T_o = 4 \times 10^{-4}$

$I_{RMS} := I_p \sqrt{\frac{k}{3}} \qquad I_{RMS} = 36.515$

$I_{AVG} := \frac{\frac{1}{2} \cdot k \cdot T \cdot I_p}{T} \qquad I_{AVG} = 20$