Electronics Lab Course
Experiment #0: Introduction and Preparational Experiment

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0.2.1.A

$$\begin{aligned} U(t) = &\quad U_0 \cdot \sin(\omega t) \\ U_{PP} = &\quad 2 \cdot U_0 \\ U_P = &\quad U_0 \\ U_{RMS} = &\quad \frac{U_0}{\sqrt{2}} \end{aligned}$$

0.2.1.B

For a symmetrical rectangular voltage from U_P to $-U_P$[1]

$$U_{RMS} = \quad 0$$

0.2.2.C

$$\begin{aligned} \text{To proof:} \quad R_i &= \frac{U_2 - U_1}{I_1 - I_2} \\ U_n &= U_0 \frac{R_n}{R_n + R_i} \\ I_n &= \frac{U_n}{R_n} \\ \Leftrightarrow I_n &= U_0 \frac{1}{R_n + R_i} \\ U_2 - U_1 &= U_0 \left(\frac{R_2}{R_2 + R_i} - \frac{R_1}{R_1 + R_i} \right) \\ I_1 - I_2 &= U_0 \left(\frac{1}{R_1 + R_i} - \frac{1}{R_2 - R_i} \right) \\ \Rightarrow \frac{U_2 - U_1}{I_1 - I_2} &= \frac{\left(\frac{R_2}{R_2 + R_i} - \frac{R_1}{R_1 + R_i} \right)}{\left(\frac{1}{R_1 + R_i} - \frac{1}{R_2 + R_i} \right)} \\ &= \frac{R_2 (R_1 + R_i) - R_1 (R_2 + R_i)}{R_2 + R_i - R_1 - R_i} \\ &= \frac{R_i (R_2 - R_1)}{R_2 - R_1} \\ &= R_i \end{aligned}$$

[1] In this case with $U_P = 10\,\mathrm{V}$

0.3.3.E

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