

ECE 3 Lab 2 Prelab

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Problem 1

$$\begin{aligned}\text{RMS} &= \sqrt{\frac{1}{T} \int_0^T f^2(t) dt} \\ &= \sqrt{\frac{1}{T} \int_0^T a^2 dt} \\ &= \sqrt{a^2} = a\end{aligned}$$

$$V_{pp} = 2a$$

$$\frac{\text{RMS}}{V_{pp}} = \boxed{\frac{1}{2}}$$

Problem 2

$$\begin{aligned}\text{RMS} &= \sqrt{\frac{1}{T} \int_0^T f^2(t) dt} \\&= \sqrt{\frac{2}{T} \left(\int_0^{\frac{T}{4}} \left(\frac{4at}{T} \right)^2 dt + \int_{\frac{T}{4}}^{\frac{T}{2}} \left(\frac{4a(\frac{T}{2} - t)}{T} \right)^2 dt \right)} \\&= \frac{4a}{T} \sqrt{\frac{2}{T} \left(\frac{\left(\frac{T}{4}\right)^3}{3} + \frac{\left(\frac{T}{4}\right)^3}{3} \right)} \\&= \frac{4a}{T} \sqrt{\frac{2}{T} \left(\frac{\left(\frac{T}{4}\right)^3}{3} + \frac{\left(\frac{T}{4}\right)^3}{3} \right)} \\&= \frac{a}{\sqrt{3}}\end{aligned}$$

$$V_{pp} = 2a$$

$$\frac{\text{RMS}}{V_{pp}} = \boxed{\frac{1}{2\sqrt{3}}}$$

Problem 3

wrong Probe Attenuation

Problem 4

Wrong Function Generator Output Impedance

Problem 5

To filter out the DC components and isolate the AC components.