RMS for sinusformet signal

$$NB! \quad \omega = 2\pi f = \frac{2\pi}{T}$$

$$V(t) = V_0 \cdot \sin \omega t$$

$$V_{RMS} = \sqrt{\frac{1}{T} \int_0^T V^2(t)\,dt} = \sqrt{\frac{1}{T} \int_0^T V_0^2 \cdot \sin^2 \omega t \cdot dt}$$

$$= V_0 \sqrt{\frac{2}{T} \int_0^{T/2} \sin^2 \omega t \, dt} = V_0 \cdot \sqrt{\frac{2}{T} \left[\frac{t}{2} - \frac{1}{4\omega} \sin(2\omega t) \right]_0^{T/2}}$$

$$= V_0 \cdot \sqrt{\frac{2}{T} \left[\frac{T}{4} - \frac{1}{4\omega} \cdot \sin\left(2\frac{2\pi}{T} \cdot T\right) - 0 - \sin 0 \right]} = V_0 \cdot \sqrt{\frac{2}{T} \cdot \frac{T}{4}} = \underline{\underline{\frac{V_0}{\sqrt{2}}}}$$

$$\sqrt{V_{AV}^2} = V_{RMS} = \frac{V_0}{\sqrt{2}} \approx 0,707 \cdot V_0$$

$$V_{AV} = \frac{2 \cdot V_0}{\pi} \approx 0,637 \cdot V_0 < V_{RMS}!$$

$$V_{AV}^2 = 50$$

$$\sqrt{V_{AV}^2} = V_{RMS} = \sqrt{50} \approx \underline{7,07}$$

$$V_{AV} = 5$$

NB!