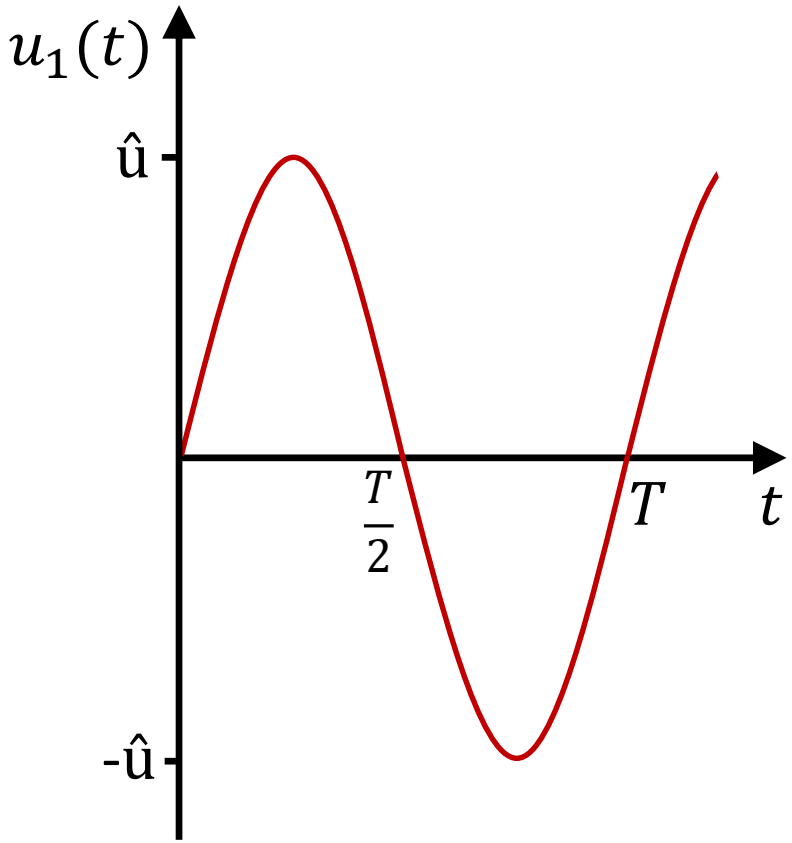
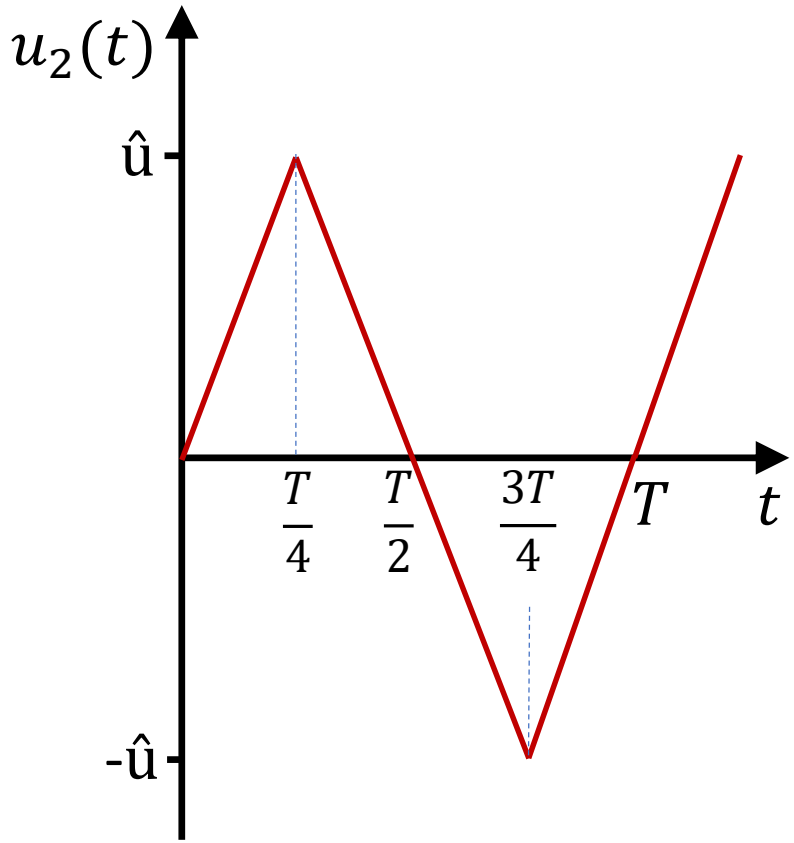
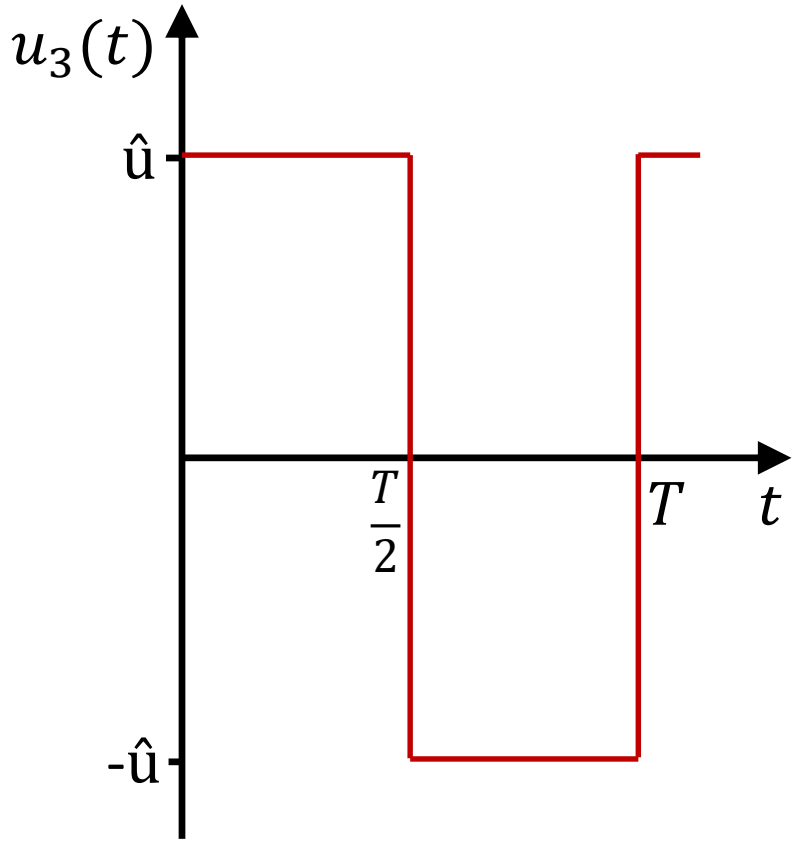


Sinus



Dreieck

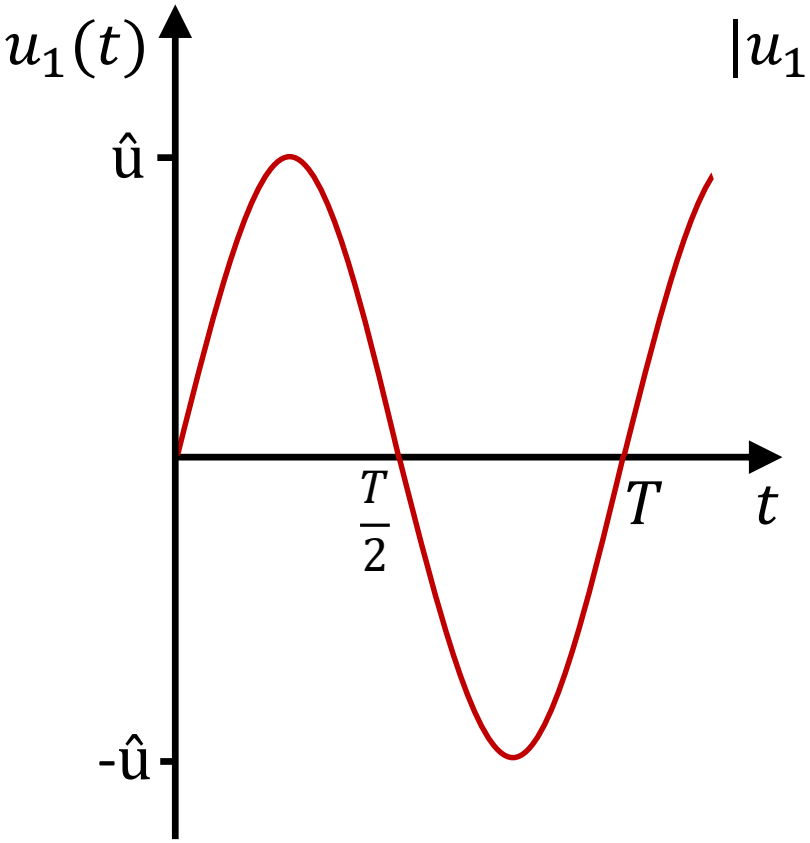


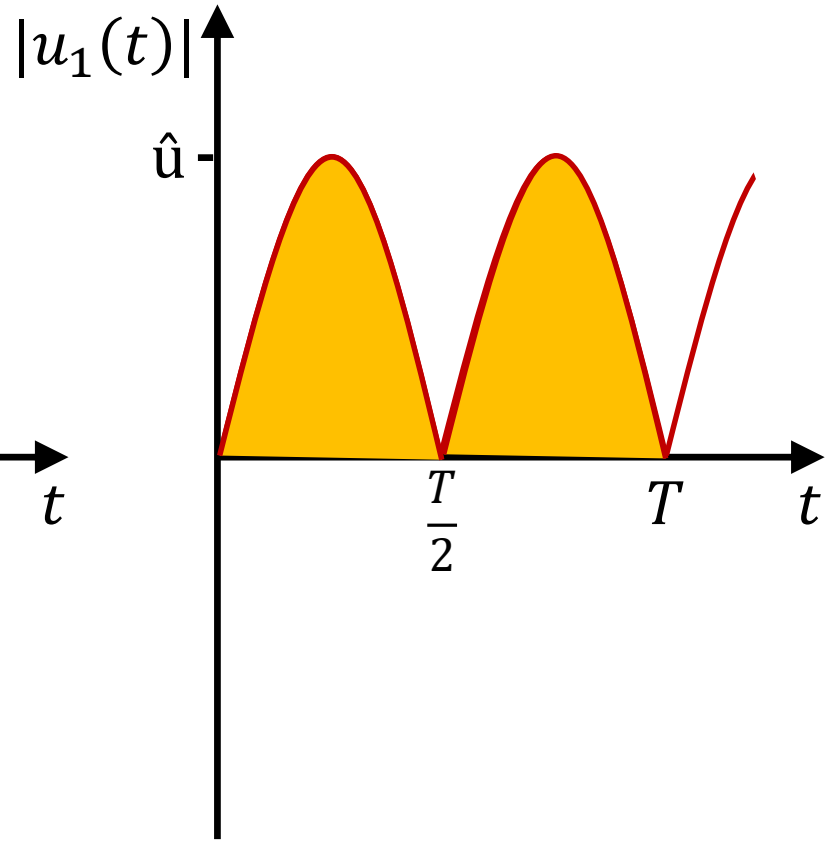
Rechteck

Gleichrichtwert:

$$\overline{|u(t)|} = \frac{1}{T} \int_{t_0}^{t_0+T} |u(t)| \cdot \mathrm{d}t$$

Sinus





$$\overline{|u_1(t)|} = \frac{1}{T}\int_0^T |\hat{u}\cdot\sin(\omega t)|\cdot dt$$

$$= \frac{2}{T}\int_0^{T/2} \hat{u}\cdot\sin(\omega t)\cdot dt$$

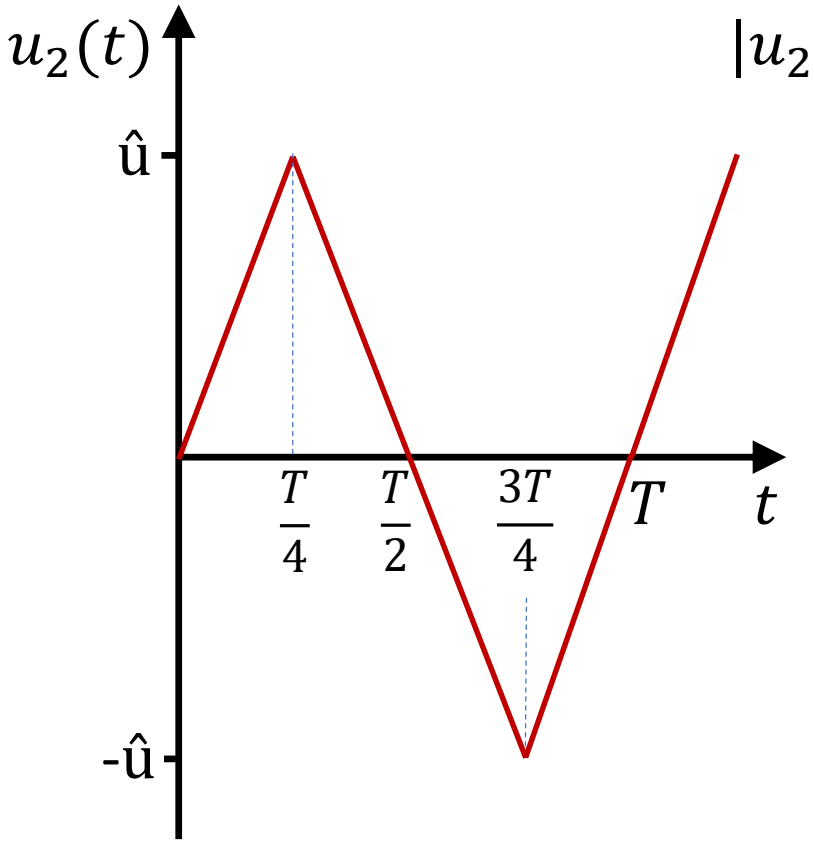
$$= \frac{2\hat{u}}{T}\left[\frac{-\cos(\omega t)}{\omega}\right]_0^{T/2}$$

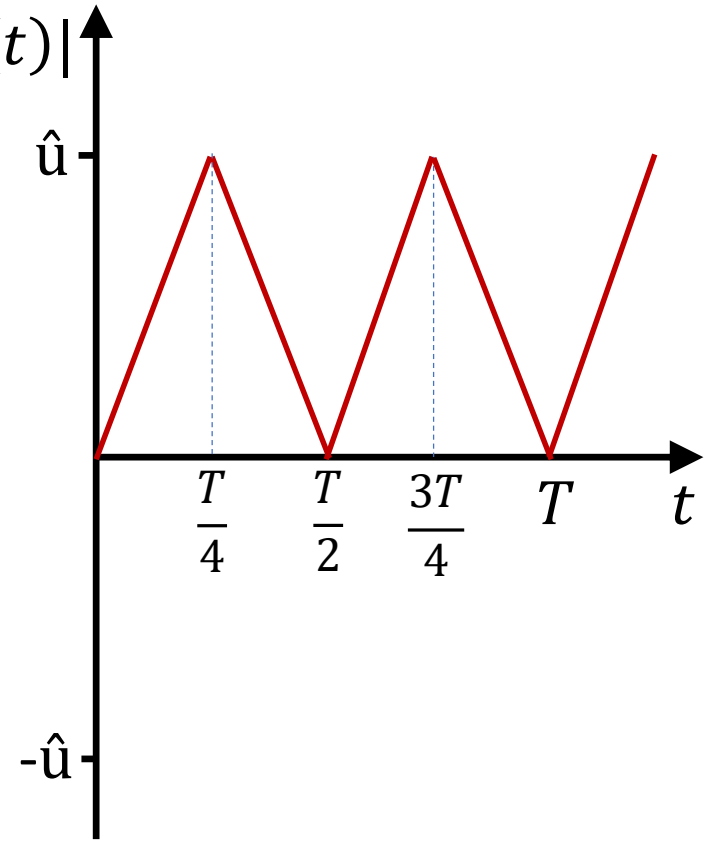
$$= \frac{2\hat{u}}{T}\left[\frac{-\cos\left(\frac{2\pi}{T}t\right)}{\frac{2\pi}{T}}\right]_0^{T/2}$$

$$= \frac{\hat{u}}{\pi}\left(\underbrace{-\cos\left(\frac{2\pi}{T}\cdot\frac{T}{2}\right)}_{-1} + \underbrace{\cos\left(\frac{2\pi}{T}\cdot 0\right)}_{1}\right)$$

$$\rightarrow \overline{|u_1(t)|} = \frac{2\hat{u}}{\pi}$$

Dreieck





$$\overline{|u_2(t)|} = \frac{4}{T}\int_0^{T/4} \frac{4\hat{u}}{T}\, t \cdot \mathrm{d}t$$

$$= \frac{16\hat{u}}{T^2}\int_0^{T/4} t \cdot \mathrm{d}t$$

$$= \frac{16\hat{u}}{T^2}\left[\frac{1}{2}t^2\right]_0^{T/4}$$

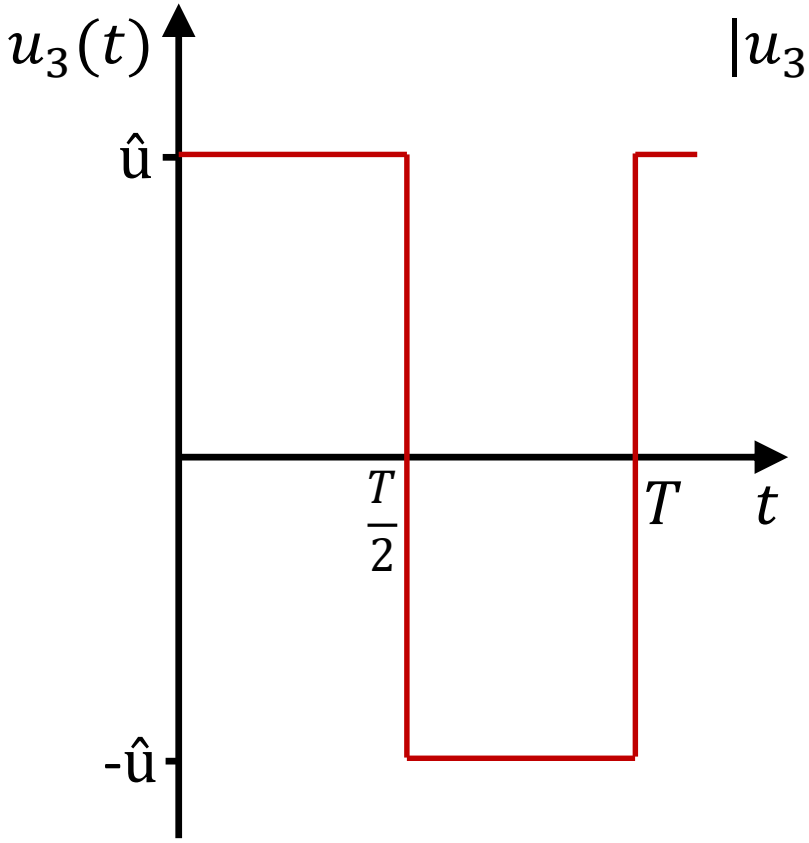
$$= \frac{8\hat{u}}{T^2}\left(\left(\frac{T}{4}\right)^2 - 0\right)$$

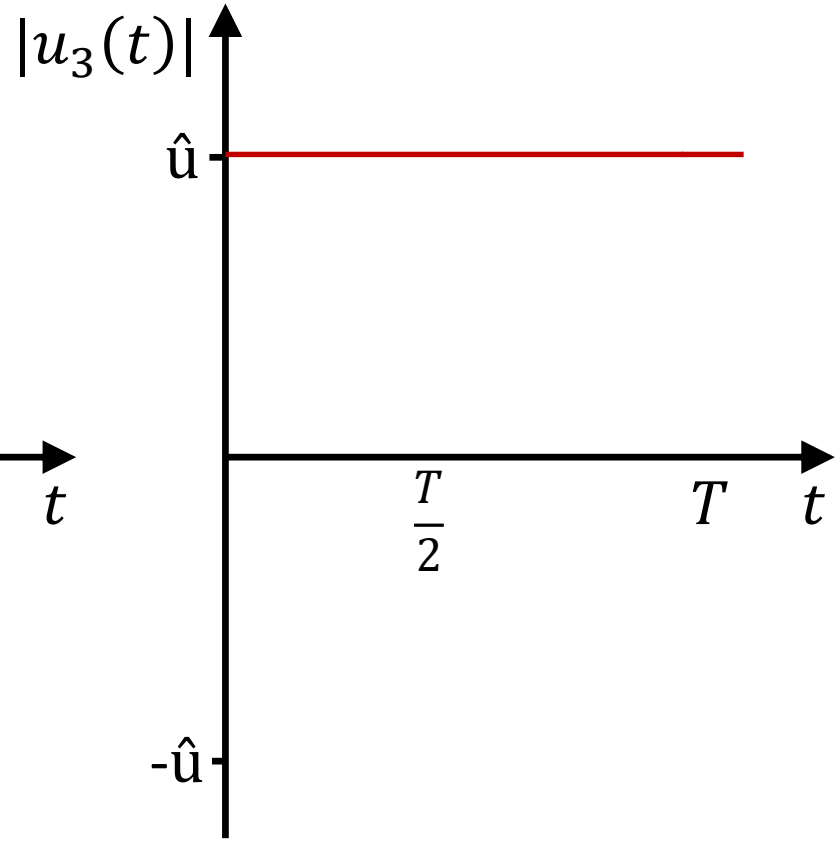
$$= \frac{8\hat{u}}{T^2} \cdot \frac{T^2}{16}$$

$$= \frac{\hat{u}}{2}$$

$$\rightarrow \overline{|u_2(t)|} = \frac{\hat{u}}{2}$$

Rechteck





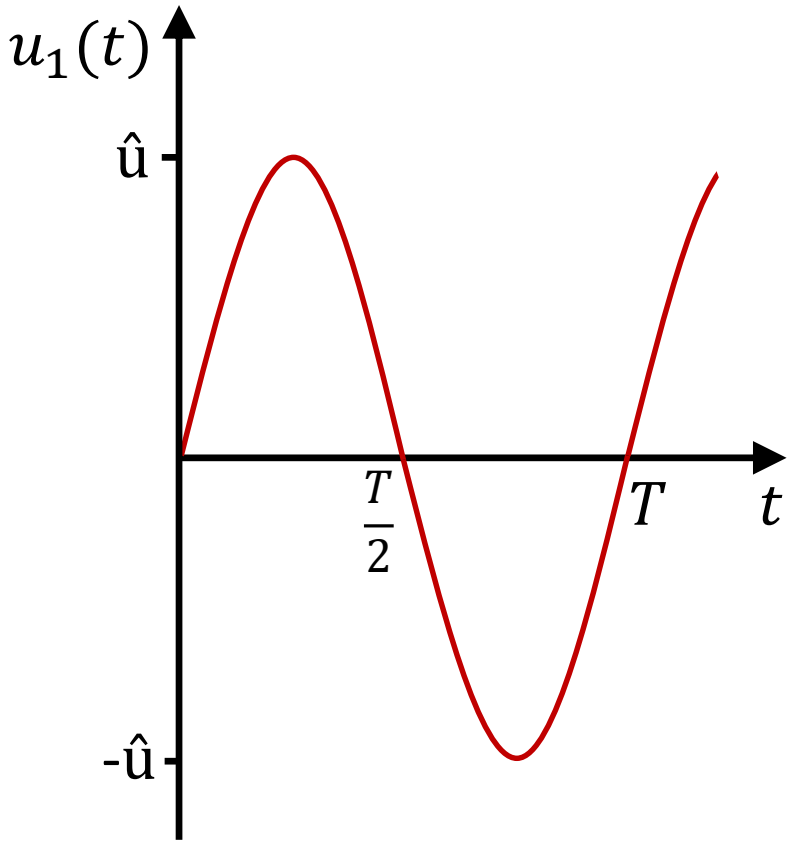
$$\overline{|u_3(t)|} = \frac{1}{T}\int_0^T \hat{u} \cdot dt$$

$$= \frac{\hat{u}}{T}[t]_0^T$$

$$= \frac{\hat{u}}{T}(T - 0)$$

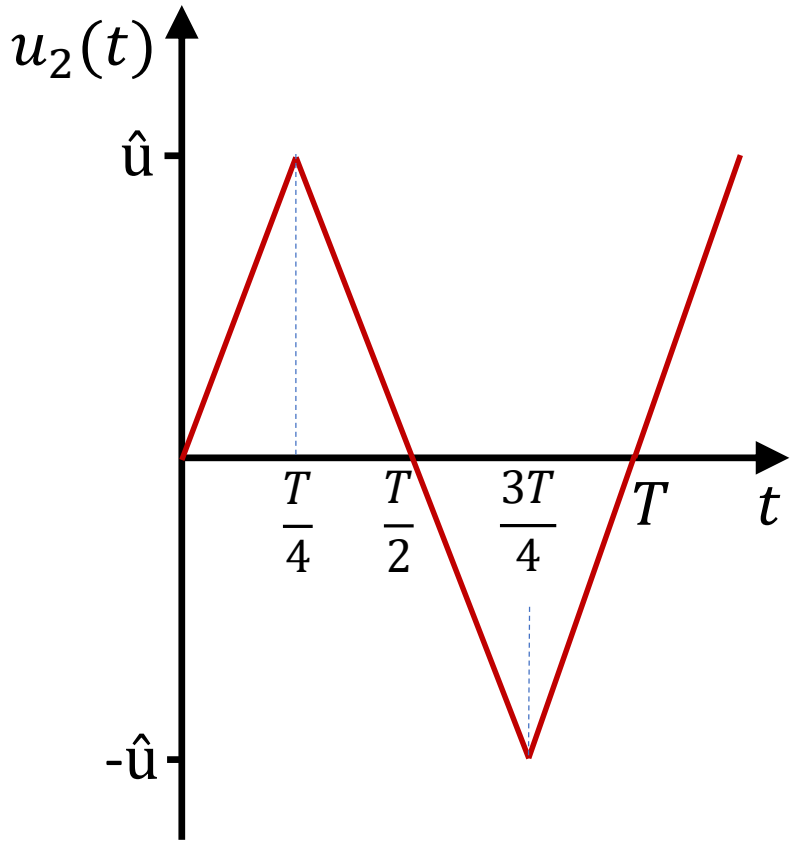
$$= \hat{u}$$

$$\rightarrow \overline{|u_3(t)|} = \hat{u}$$



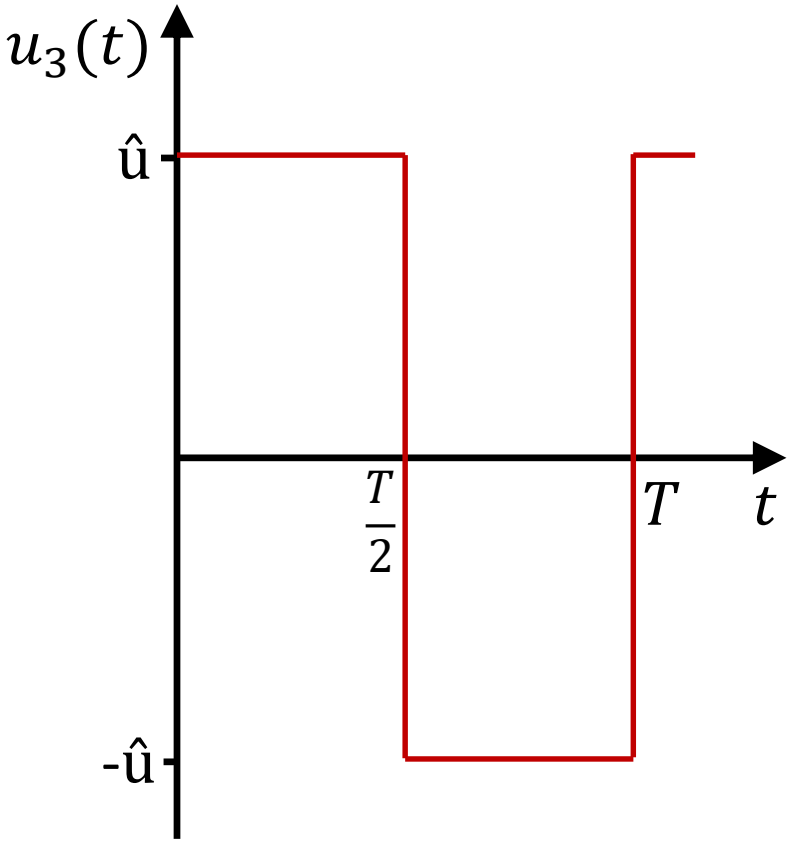
Sinus

$$\overline{|u_1(t)|} = \frac{2\hat{u}}{\pi}$$



Dreieck

$$\overline{|u_2(t)|} = \frac{\hat{u}}{2}$$



Rechteck

$$\overline{|u_3(t)|} = \hat{u}$$