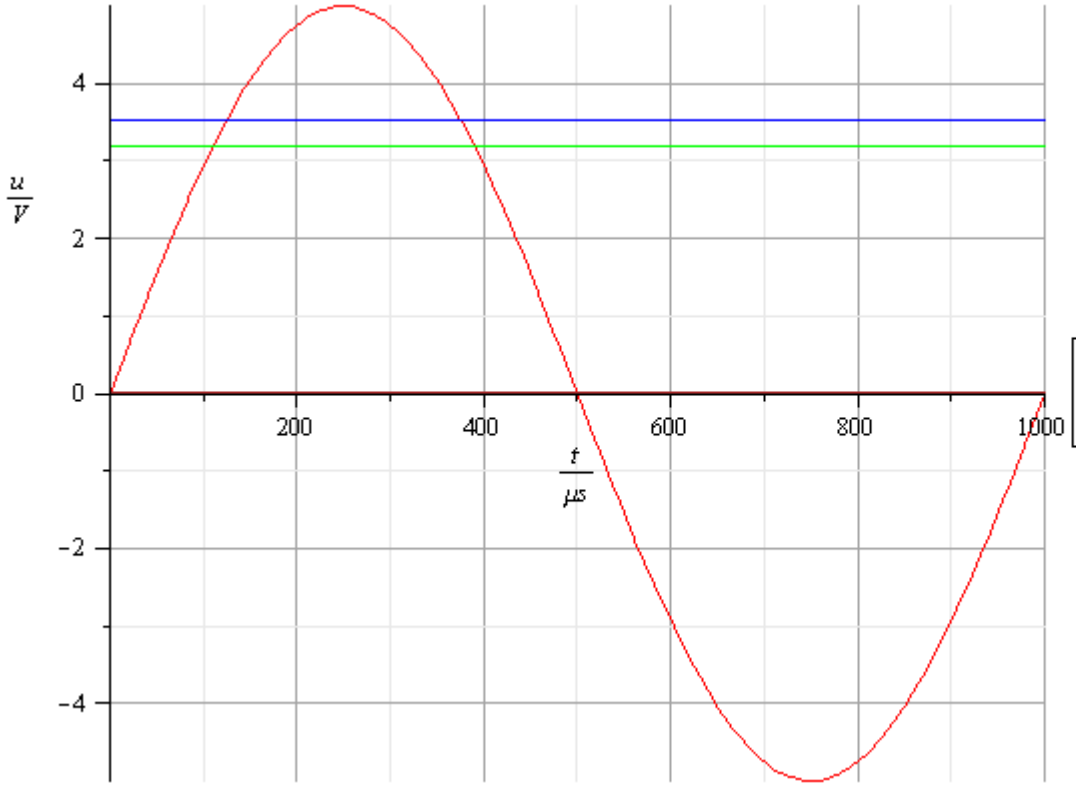
2.1.

a) sinusförmige Spannung

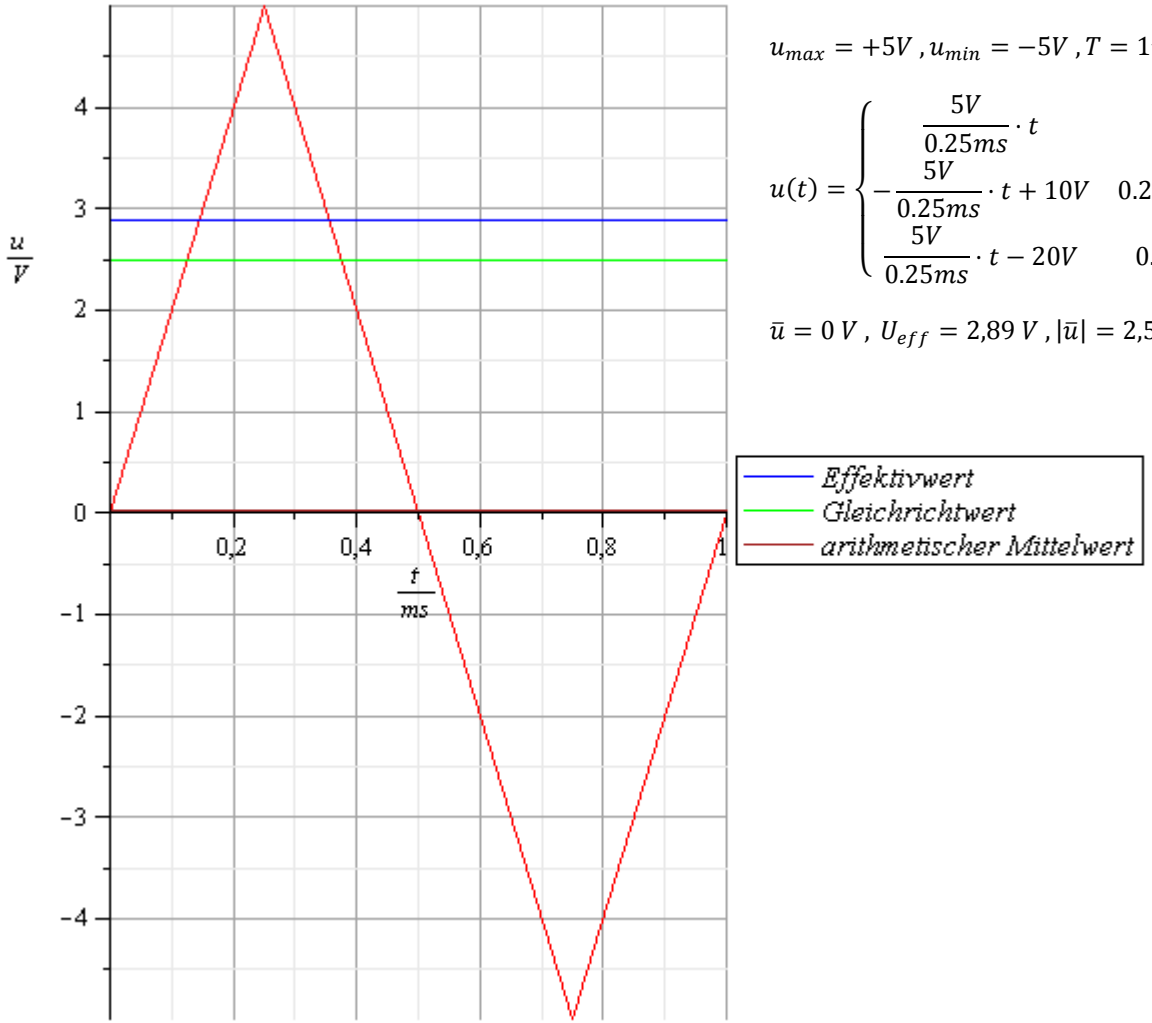


$\hat{u} = 5V\ ,\ \ f = 1\ kHz$

$u(t) = 5V \cdot \sin(2\pi f t)$

$\bar{u} = 0\ V\ ,\ U_{eff} = 3{,}54\ V\ ,\ |\bar{u}| = 3{,}18\ V$

b) Dreieckspannung

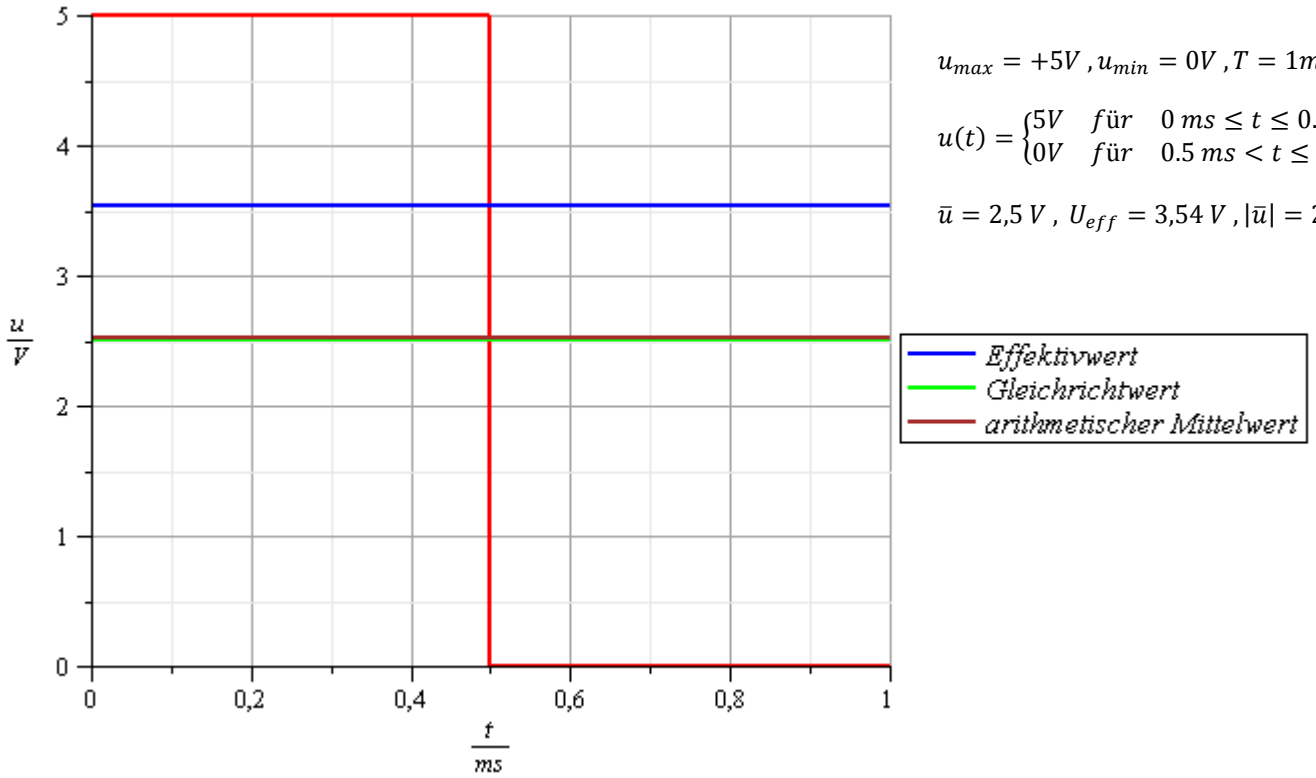


$u_{max} = +5V\,, u_{min} = -5V\,, T = 1ms$

$$u(t) = \begin{cases} \dfrac{5V}{0.25ms} \cdot t & 0 \le t \le 0.25\ ms \\ -\dfrac{5V}{0.25ms} \cdot t + 10V & 0.25\ ms < t \le 0.75\ ms \\ \dfrac{5V}{0.25ms} \cdot t - 20V & 0.75\ ms < t \le 1\ ms \end{cases}$$

$\bar{u} = 0\ V\,,\ U_{eff} = 2{,}89\ V\,, |\bar{u}| = 2{,}5\ V$

c) Rechteckspannung

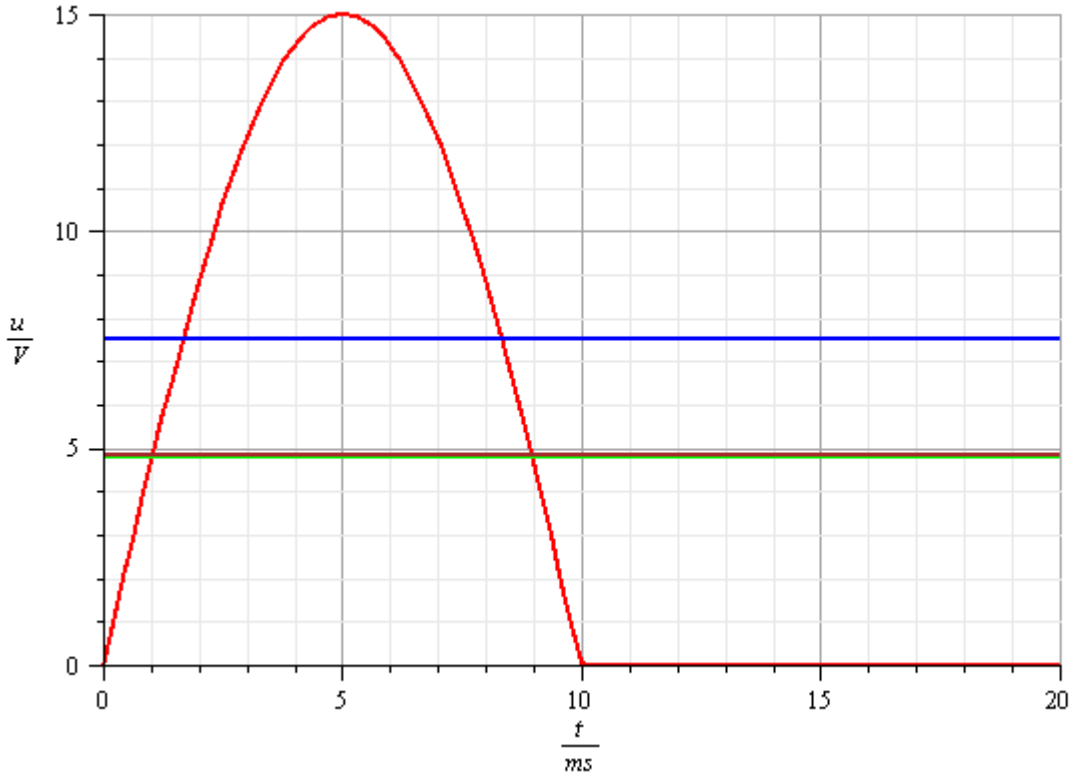


$u_{max} = +5V\,, u_{min} = 0V\,, T = 1ms\,, V = 0.5$

$$u(t) = \begin{cases} 5V & \text{für} \quad 0\ ms \leq t \leq 0.5\ ms \\ 0V & \text{für} \quad 0.5\ ms < t \leq 1\ ms \end{cases}$$

$\bar{u} = 2{,}5\ V\,,\ U_{eff} = 3{,}54\ V\,, |\bar{u}| = 2{,}5\ V$

d) Ausgangsspannung einer Einweggleichrichtung

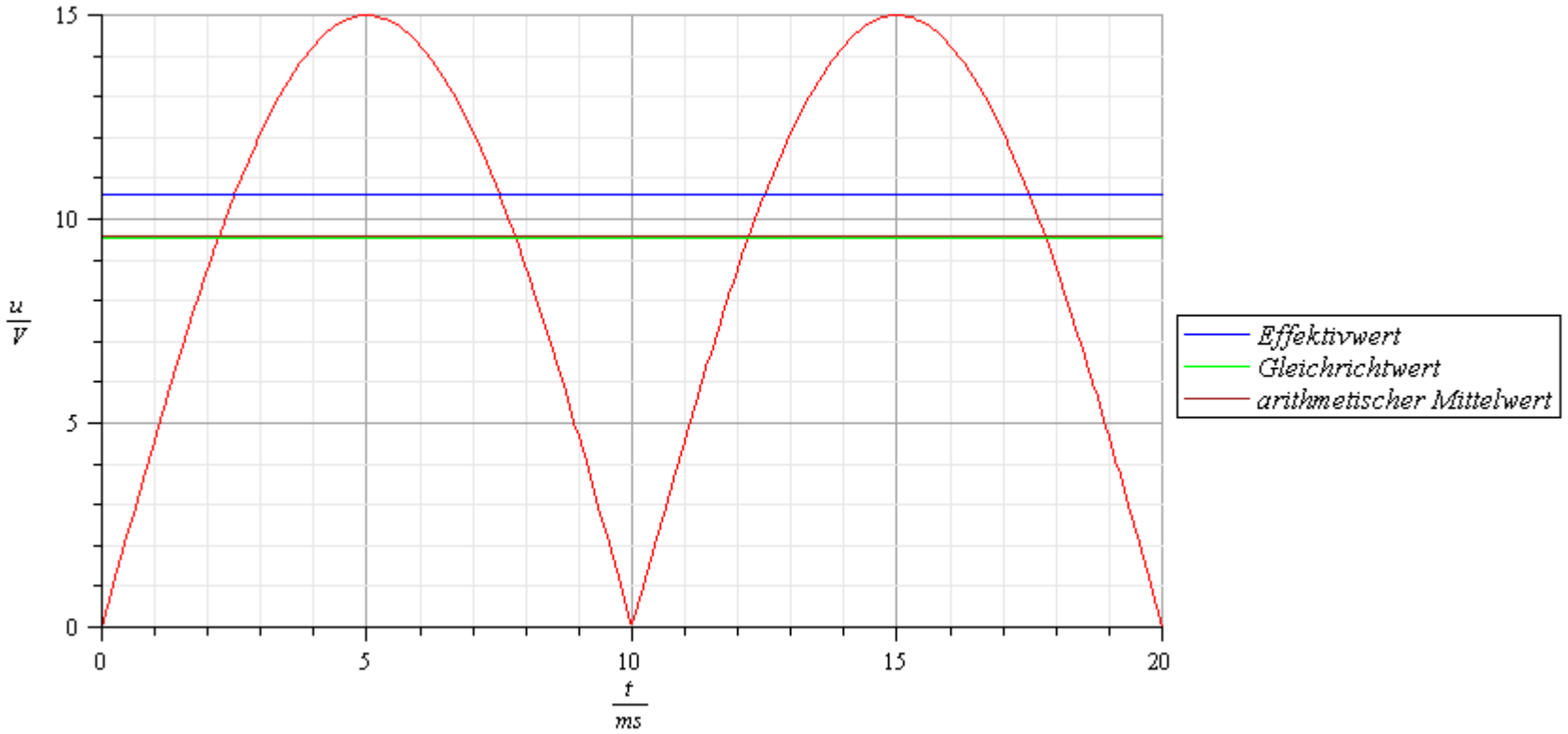


$\hat{u} = 15\ V\ , f = 50\ Hz\ , Dioden\ verlustfrei\ angenommen$

$$u(t) = \begin{cases} 15\ V \cdot \sin(2\pi f t) & für \quad 0\ ms \leq t \leq 10\ ms \\ 0V & für \quad 10\ ms < t \leq 20\ ms \end{cases}$$

$\bar{u} = 4{,}77\ V\ ,\ U_{eff} = 7{,}5\ V\ , |\bar{u}| = 4{,}77\ V$

e) Ausgangsspannung einer Zweiweggleichrichtung



$\hat{u} = 15\ V\ , f = 50\ Hz\ , Dioden\ verlustfrei\ angenommen$

$u(t) = |15\ V \cdot \sin(2\pi f t)|$

$\bar{u} = 9{,}55\ V\ ,\ U_{eff} = 10{,}61\ V\ , |\bar{u}| = 9{,}55\ V$