Fourierreihe einer Rechteckschwingung

Originalfunktion

$$f(t) := \begin{cases} 1 & \text{falls } \; t \in [0, \pi) \\ -1 & \text{falls } \; t \in [\pi, 2\pi). \end{cases}$$

Fourierkoeffizienten

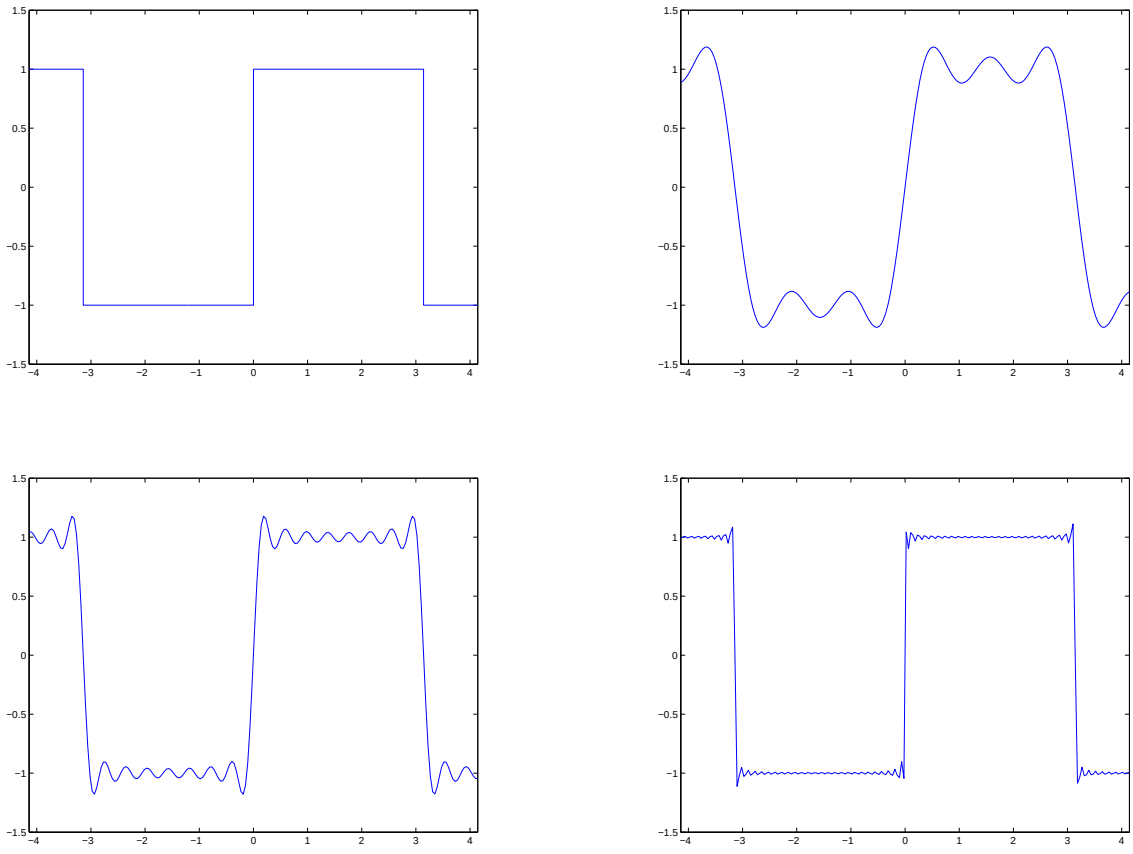
$$a_k = 0.$$

$$b_k = \begin{cases} 4/(k\pi) & \text{falls } \; k \text{ ungerade} \\ 0 & \text{falls } \; k \text{ gerade.} \end{cases}$$

Fourierreihe

$$\frac{4}{\pi}\left(\frac{\sin t}{1} + \frac{\sin 3t}{3} + \frac{\sin 5t}{5} + \ldots\right)$$

Originalfunktion und Partialsummen für $n = 5, 15, 100$



Fourierreihe einer Sägezahnfunktion

Originalfunktion

$$f(t) = t \text{ auf } [-\pi, \pi)$$

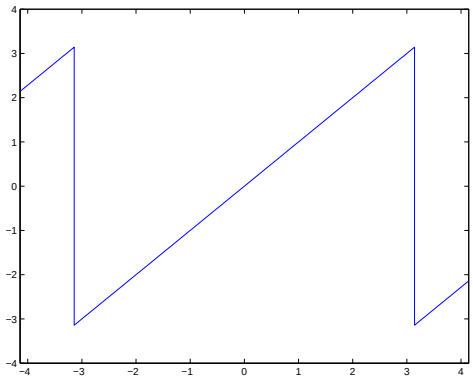
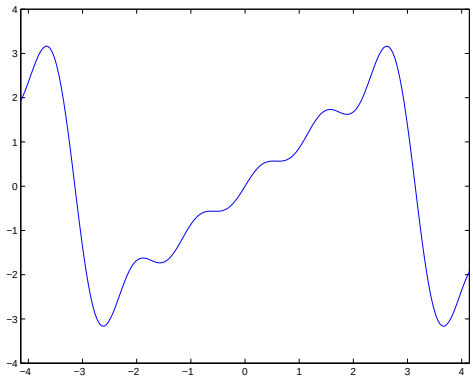
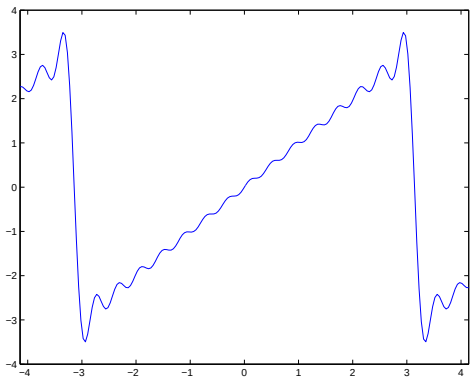
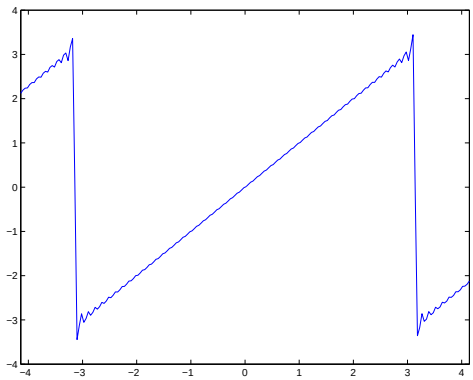
Fourierkoeffizienten

$$a_k = 0,$$
$$b_k = (-1)^{k+1}\frac{2}{k}.$$

Fourierreihe

$$2\left(\frac{\sin t}{1} - \frac{\sin 2t}{2} + \frac{\sin 3t}{3} + \dots\right).$$

Originalfunktion und Partialsummen für $n = 5, 15, 100$

Fourierreihe eines Dreiecksimpulses

Originalfunktion

$$f(t) = \frac{2}{\pi}\,|t| - 1 \text{ auf } [-\pi, \pi)$$

Fourierkoeffizienten

$$a_k = \begin{cases} -\frac{4}{\pi\, k^2} & \text{falls } \; k \text{ ungerade} \\ 0 & \text{falls } \; k \text{ gerade} \end{cases}$$

$$b_k = 0.$$

Fourierreihe

$$-\frac{4}{\pi\, k^2}\left(\frac{\cos t}{1} + \frac{\cos 3t}{3^2} + \frac{\cos 5t}{5^2} + \ldots\right).$$

Originalfunktion und Partialsummen für $n = 5, 15, 100$