N100) Nitsche:

$$\underline{c}_n = \frac{1}{T_1} \int_{(T_1)} u(t)\, e^{-jn\omega_1 t}\, dt = \frac{1}{T_1} \int_0^{T_1/2} \hat{u}\, e^{-jn\omega_1 t}\, dt + \frac{1}{T_1} \int_{T_1/2}^{T_1} -\hat{u}\, e^{-jn\omega_1 t}\, dt$$

$$= \frac{\hat{u}}{T_1} \left(\int_0^{T_1/2} e^{-jn\omega_1 t}\, dt - \int_{T_1/2}^{T_1} e^{-jn\omega_1 t}\, dt \right)$$

$$= \frac{\hat{u}}{T_1} \left(\left[\frac{1}{-jn\omega_1} e^{-jn\omega_1 t} \right]_0^{T_1/2} - \left[\frac{1}{-jn\omega_1} e^{-jn\omega_1 t} \right]_{T_1/2}^{T_1} \right)$$

$$= \frac{\hat{u}}{T_1} \cdot \frac{1}{-jn\omega_1} \left(\left[e^{-jn\omega_1 t} \right]_0^{T_1/2} - \left[e^{-jn\omega_1 t} \right]_{T_1/2}^{T_1} \right)$$

$$= \frac{\hat{u}}{-j2\pi n} \left(2e^{-jn\omega_1 T_1/2} - \underbrace{e^0}_{1} - \underbrace{e^{-jn\omega_1 T_1}}_{1} + e^{-jn\omega_1 T_1/2} \right) \qquad T_1 = 2\pi \Rightarrow e^{2\pi} = e^0$$

$$= j \frac{\hat{u}}{\pi n} \left(e^{-jn\pi} - 1 \right) \quad \text{für } -\infty < n < \infty$$

$$= -j \frac{2\hat{u}}{\pi n} \quad \text{für } n = \ldots, -3, -1, 1, 3, \ldots$$

Umrechnung in reelle Fourier-Koeffizienten

$$a_0 = c_0 \overset{\text{hier}}{=} 0$$

$$a_n = 2\,\mathrm{Re}[c_n] = 0$$

$$b_n = -2\,\mathrm{Im}[c_n] = \frac{4\hat{u}}{\pi n} \quad \text{für } n = 1, 3, 5, 7, \ldots$$

⇒ N130 mal in Octave durchrechnen