Problem 1. Consider the Gaussian function \( u_0(x) = e^{-\pi|x|^2} \). Recall that \((e^{it\Delta})_{t \in \mathbb{R}}\) is unitary on \( L^2(\mathbb{R}^d) \), so
\[
\|e^{it\Delta}u_0\|_2 = \|u_0\|_2 = 1.
\]
Recall also Example 4.1 on p. 64 in [LP], where \( u(x, t) := (e^{it\Delta}u_0)(x) \) is computed. Compute the left and the right side of equation (4.12) on p. 66 in [LP], for \( f = u_0 \).

Problem 2. Solve Exercise 1.1(ii) on p. 19 in [LP].

Problem 3. Solve Exercise 1.8 on p. 20 in [LP].

Problem 4. Solve Exercise 1.13(iii) on p. 21 in [LP].

This tutorial sheet is to be solved during the tutorial class on 24.07.2019.