

HOMWORK 11

1) Let m, n be two integers, and recall that $e^{ix} = \cos(x) + i \sin(x)$ by Euler's formula. Compute

$$\int_{-\pi}^{\pi} e^{-imx} e^{inx} dx$$

2) Solve the wave equation

$$\begin{cases} u_{tt} - u_{xx} = 0 & (t, x) \in (0, \infty) \times (0, \pi) \\ u_x(t, 0) = u_x(t, \pi) = 0 & t > 0 \\ u(0, x) = g(x), \quad u_t(0, x) = h(x) \end{cases}$$

Your solution should be an infinite series involving the Fourier coefficients of the initial data. Do not worry about convergence issues for this problem.

3) Evans 4.7 Problem 2