

Exercise 6

Use the separation of variables to solve the Laplace equation

$$u_{xx} + u_{yy} = 0, \quad 0 \leq x \leq a, \quad 0 \leq y \leq b,$$

with $u(0, y) = 0 = u(a, y)$ for $0 \leq y \leq b$, and $u(x, 0) = f(x)$ for $0 < x < a$; $u(x, b) = 0$ for $0 \leq x \leq a$.