1. Solve:

\[ u_{xx} + u_{yy} = 0, \quad 0 < x < \pi, \quad 0 < y < 1, \]

Subject to

\[ u(0, y) = 0, \quad u(\pi, y) = 0, \quad 0 < y < 1; \]
\[ u(x, 0) = 0, \quad u(x, 1) = f(x), \quad 0 < x < \pi. \]