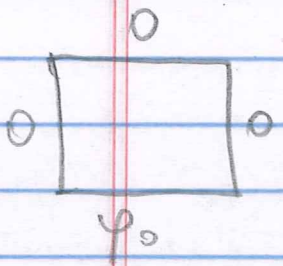
In addition to applications to the Laplace equation on a rectangle

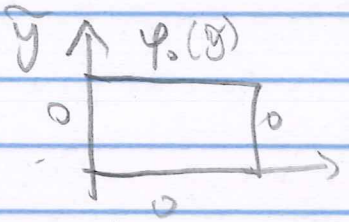
Remark If we want to treat the Dirichlet problem for Laplace equation $u_{xx}+u_{yy}=0$ on $0<x<L$, $0<y<H$ with boundary conditions described by



This is reduced to the previous case by making the change of variable y.

$\tilde{y} = H - y$

Then in new coordinates the nonzero boundary condition will be in the top

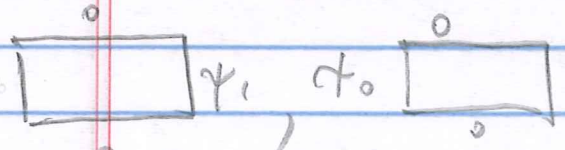


Then we right the same formula as formula (13) on page 14 just instead of y we have to put $H-y$

$$u(x,y) = \sum_{n=1}^{\infty} c_n \sinh\left(\frac{\pi n}{L}(H-y)\right) \sin\left(\frac{\pi n}{L}x\right)$$

where $c_n = \dfrac{b_n}{\sinh \frac{\pi n}{L} H}$ and $b_n = \dfrac{2}{L}\int_0^L \varphi_0(\xi) \sin\dfrac{n\pi\xi}{L}\, d\xi$

For the boundary conditions described by



we switch the role of x and y and L and H