$$\begin{cases} B'' = -\lambda B \\ B(0) = 0 = B(M) \end{cases}$$

$$B_j = \sin \frac{j\pi}{M} y \, , \quad j = 1, 2, 3, \ldots .$$

(odd periodic extension(s) on $(-M, M)$)

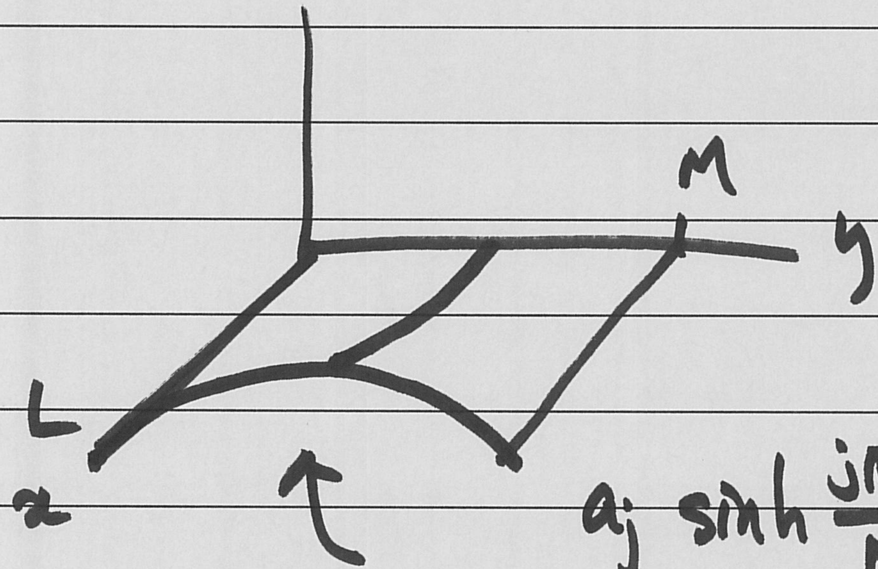
$$A_j'' = \lambda_j A_j = + \frac{j^2\pi^2}{M^2} A_j$$

$$A_j = a_j \cosh \frac{j\pi}{M} x + b_j \sinh \frac{j\pi}{M} x$$

$$A_j(0) = 0. \rightarrow a_j = 0.$$

[redacted]

$$\boxed{u_j = a_j \sinh \frac{j\pi}{M} x \, \sin \frac{j\pi}{M} y}$$



$a_j \sinh \frac{j\pi L}{M} \quad \sin \frac{j\pi}{M} y \qquad (j=1).$

$$u = \sum_{j=1}^{\infty} a_j \sinh \frac{j\pi}{M} x \, \sin \frac{j\pi}{M} y$$

Want $\displaystyle \sum_{j=1}^{\infty} \underbrace{a_j \sinh \frac{j\pi L}{M}} \sin \frac{j\pi}{M} y = \underline{\underline{h_1(y)}}$

[redacted]

$$h_1(y) = \sum_{j=1}^{\infty} \underbrace{\boxed{a_j \sinh \frac{j\pi L}{M}}}_{\text{known}} \sin \frac{j\pi}{M} y$$

$$\boxed{a_j = \frac{2}{L \sinh \frac{j\pi L}{M}} \int_0^L h_1(y) \sin \frac{j\pi}{M} y \, dy}$$

$\cancel{2}$

$a_j \sinh \int_{-L}^{L} \sin^2$

$=$

L

$\int_{-L}^{L} h \sin$

$=$

$2 \int_0^L h \sin$

[redacted]