

# FOURIER SERIES, PARTIAL SUMS AND ORTHOGONAL PROJ.

If  $f: [-\pi, \pi] \rightarrow \mathbb{C}$  is square integrable, then ~~its~~ the partial sum

$$S_N f(x) = \sum_{j=0}^N a_j \cos(jx) + \sum_{j=1}^N b_j \sin(jx)$$

~~is~~ is the projection of  $f$  onto the subspace

$$V_N = \text{span} \left\{ 1, \cos(x), \cos(2x), \dots, \cos(Nx), \right. \\ \left. \sin(x), \sin(2x), \dots, \sin(Nx) \right\}.$$