MA 2103 - 2023 Homework 01

(*) Deadline for Submission is 17 Aug 2023

(1) Evaluate the integral

$$\int_{-\pi}^{\pi} \cos mx \sin nx \, dx$$

(2) Evaluate the integral

$$\int_{-\pi}^{\pi} \cos mx \cos nx \, dx$$

when $m \neq n$ and
when $m = n$

(3) Evaluate the integral

$$\int_{-\pi}^{\pi} \sin mx \sin nx \, dx$$

when $m \neq n$ and
when $m = n$

④ If $f(x)$ is an L^2 function in the interval $[-\pi, \pi]$, it can be written as

$$f(x) = a_0 + \sum_{n=1}^{\infty} a_n \cos nx + \sum_{m=1}^{\infty} b_n \sin nx$$

find the constants a_n and b_n including a_0 in terms of $f(x)$