Exercise 1

Find the smallest period for the functions:

\[ \sin 2x, \quad \cos \frac{x}{2}, \quad \sin n\pi x, \quad |\sin x|. \]

Exercise 2

Which systems of functions are orthogonal with respect to the inner product \( \langle f, g \rangle = \int_{-\pi}^{\pi} f(x)g(x)dx \)?

(i) \( \{1, x\} \);

(ii) \( \{1, (x^2 - \frac{\pi^2}{3})\} \);

(iii) \( \{1, x, (x^2 - \frac{\pi^2}{3})\} \).