

Fourier Analysis

Assignment 1

20181004

Name : _____

Student ID : _____

- Find a period of the given function
 - $\cos x$
 - $\cos \pi x$
 - $\cos x + \cos 2x$
- A π -periodic function $f(x) = \sin x$ ($0 \leq x < \pi$) is described over an interval of length π . Compute the integral $\int_{-\pi/2}^{\pi/2} f(x) dx$
Hint : Theorem 1 of the Page 20.
- Find a formula that describes the function in Figure 1.
 - Describe the set of points where f is continuous. Compute $f(x+)$ and $f(x-)$ at all points x where f is not continuous. Is the function piecewise continuous?

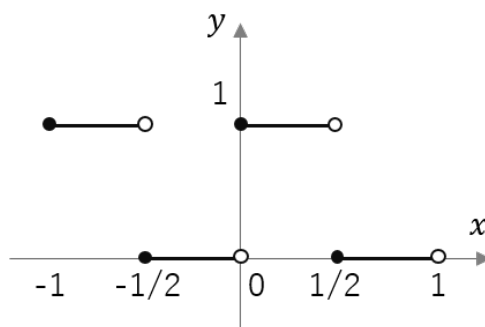


FIGURE 1 – For Exercise 3.

4. Prove that

$$\int_{-p}^p \cos \frac{m\pi x}{p} \cos \frac{n\pi x}{p} dx = 0 \quad \text{if } m \neq n, \quad m, n = 0, 1, 2, \dots$$

Hint : Trigonometric identity.

Reading Materials : Section 2.1 of the textbook.

Textbook : Partial Differential Equations with Fourier Series and Boundary Value Problems, Second Edition, Nakhlé H. Asmar