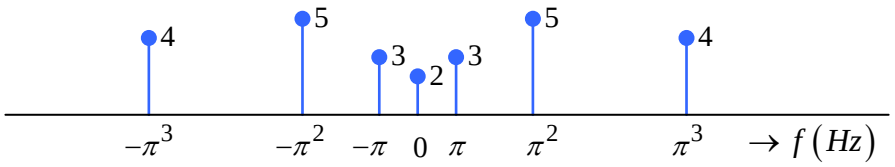
EE2023 TUTORIAL 2 (PROBLEMS)

Q.1 The discrete-frequency spectrum of a signal $x(t)$ is shown in Fig.Q.1. Classify $x(t)$ based on inferences drawn from Fig.Q.1 alone. What is the Fourier series expansion of $x(t)$?

Fig.Q.1



Q.2 Determine the Fourier series coefficients of each of the following periodic signals.

(a) $x(t) = 6\sin(12\pi t) + 4\exp\left(j(8\pi t + \pi/4)\right) + 2$

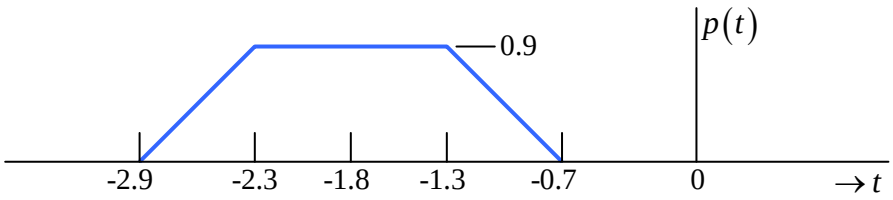
(b) $x(t) = 0.5\left(\left|\sin(\pi t)\right| + \sin(\pi t)\right)$

Q.3 Determine the Fourier series coefficients of

$$x(t) = \sum_{n=-\infty}^{\infty} 2p(t - 1.6n)$$

where $p(t)$ is given in Fig.Q.3.

Fig.Q.3



Q.4 A Fourier series analysis-synthesis system is given in Fig.Q.4.

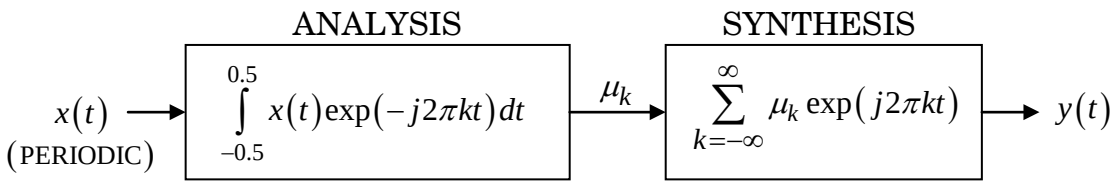


Fig.Q.4

(a) What does the analysis subsystem do?

(b) What does the synthesis subsystem do?

(c) Let $x(t) = \cos(3\pi t)$. Simply based on your understanding of the Fourier series, sketch $y(t)$ without performing any computation.

Below is a list of solved problems selected from ***Chapter 5*** *of* ***Hwei Hsu (PhD), 'The Schaum's series on Signals & Systems,' 2nd Edition****.*

The 1st Edition can be found in the following link:
http://www.kousik.net/wp-content/uploads/2010/10/Schaums-Outline-Series-Signals_Systems.pdf

Selected solved-problems: 5.4-to-5.13

These solved problems should be treated as supplementary module material catered for students who find the need for more examples or practice-problems.