

MAT 321

Quiz 0

Spring 2023

Recall that SPW stands for Signal Processing World, and that we have discussed at least three of these, each with its own description of time and frequency domains, and its own formulas for the Forward and Inverse Fourier Transforms. To identify a signal as belonging to one of these SPW, one needs to understand the descriptions of the time and frequency domains.

1. Let \mathbf{x} be a signal which is periodic with continuous time t (finite in extent on an interval of one period). The (forward) Fourier Transform of \mathbf{x} can be thought of as:
- a) a Fourier series b) an impulse response c) a delta function d) a coefficient for a phasor e) a low-pass filter

Correct Answer: a coefficient for a phasor

2. Let \mathbf{x} be a signal whose frequency values are discrete of infinite extent. Then \mathbf{x} can be represented as:
- a) a constant b) a step function c) a delta function d) a Fourier series e) an impulse response
- Correct Answer: a Fourier series

3. Let \mathbf{x} be a signal whose time values are discrete of infinite extent. Then the possible frequency values present in the spectrum of this signal can be represented as:
- a) an interval $[-\pi, \pi)$ b) $k\omega_0, k \in \mathbb{Z}$ c) all real numbers \mathbb{R} d) $k2\pi/N, k = 0, \dots, N - 1$ e) a Fourier series

Correct Answer: an interval $[-\pi, \pi)$

4. When comparing SPW2 (period functions, Fourier series) and SPW3 (discrete time signals), it is fair to say that the time and frequency domain descriptions:
- a) are the same b) switch places c) are all discrete d) are all continuous e) are all finite

Correct Answer: switch places

5. In SPW1 (finite digital signals) frequencies will be aliased due to sampling if the signal being sampled is not
- a) finite b) continuous c) band-limited d) discrete e) periodic

Correct Answer: band-limited