Assignment 10

Due on 2019-10-06, 23:00 IST.

1. Let $f(x)$ be the Fourier transform of a function $f(x) \in L^2(\mathbb{R})$ then

- $f(x) \in L^2(\mathbb{R})$
- $\int |f(x)|^2 dx < \infty$
- $\int |f(x)| dx$ may or may not be a $L^2(\mathbb{R})$ function.

Note: The answer is incorrect.

2. The Fourier transform of the Gaussian function $g(x) = e^{-x^2}$, $a > 0$ is

- $g(x) = e^{-ax^2}$
- $g(x) = e^{-ax}$
- $g(x) = e^{-ax^2}$
- $g(x) = e^{-ax^2}$

Note: The answer is incorrect.

3. Which of the following is a window function

- $f(x) = \sin x$, $x \in [0, \pi]$
- $f(x) = 0$, otherwise.
- $f(x) = x$, $x \in [0, \pi]$
- $f(x) = 0$, otherwise.

Note: The answer is incorrect.

4. In Problem 3, two functions are the window functions then the corresponding to the last window function, cosine and radius of the window is

- $0$, $\frac{\pi}{2}$
- $1$, $\frac{\pi}{2}$
- $1$, $\frac{\pi}{2}$
- $0$, $\frac{\pi}{2}$

Note: The answer is incorrect.

5. The Gabor transform for $\alpha > 0$ is given by

$$g_{\alpha, \mu}(x) = \int_{-\infty}^{\infty} e^{-i\alpha (x-t)^2} f(t) e^{-i\mu t} dt,$$

then the Gabor transform is
- a non-linear transform.
- linear transform.
- a non-linear transform for some specific value of $\alpha$ and $\mu$.
- none of the above.

Note: The answer is incorrect.

6. Consider a window function $f(x) = e^{-ax^2}$, then which of the followings are correct

- center is $\frac{\pi}{2a}$
- rotor is $\frac{1}{\sqrt{a}}$
- rotor is $\frac{1}{a}$

Note: The answer is incorrect.

7. Let $\beta = 0$, $\alpha = \frac{1}{\beta}$ and $(G_{\alpha, \mu}(x))$ be the Gabor transform of the following function

$$f(x) = \begin{cases} e^{-\alpha x^2}, & x \in [0, \infty) \\ 0, & \text{otherwise} \end{cases}$$

then the value of $(G_{\alpha, \mu}(x))$ is

- $\frac{1}{\sqrt{2\pi}}$
- $\frac{1}{\sqrt{2\pi}}$
- $\frac{1}{\sqrt{2\pi}}$

Note: The answer is incorrect.