Started on	Sunday, 29 October 2023, 9:30 AM
State	Finished
Completed on	Sunday, 29 October 2023, 10:30 AM
Time taken	59 mins 46 secs
Grade	**10.00** out of 15.00 (**67**%)

Question 1

Correct

Mark 1.00 out of 1.00

Let $x(t)$ and $y(t)$ be two signals with Fourier transforms coefficients $X(\omega)$,$Y(\omega)$, respectively. Then, the quantity $\int_{-\infty}^{\infty} X(-\omega)Y^*(\omega)d\omega$ equals

Select one:

- $\int_{-\infty}^{\infty} x(-t)y^*(t)dt$
- $2\pi \int_{-\infty}^{\infty} x(-t)y^*(t)dt$ ✓
- $\frac{1}{2\pi} \int_{-\infty}^{\infty} x^*(t)y(-t)dt$
- $\int_{-\infty}^{\infty} x^*(-t)y(t)dt$
- $2\pi \int_{-\infty}^{\infty} x(t)y^*(-t)dt$
- None of the other choices are correct
- $\frac{1}{2\pi} \int_{-\infty}^{\infty} x^*(-t)y(t)dt$

Your answer is correct.

The correct answers are: $2\pi \int_{-\infty}^{\infty} x(-t)y^*(t)dt$

, $2\pi \int_{-\infty}^{\infty} x(t)y^*(-t)dt$

Question 2

Correct

Mark 1.00 out of 1.00

Let the signal $x(t)$ have the Fourier transform $X(\omega) = \frac{\cos(2\omega)\sin(\omega)}{\omega}$. The value of the signal $x(2)$ is

Select one:

- 2π
- 1/4 ✓
- None of the other options are correct
- 1/2
- 0
- 1
- π

Your answer is correct.

The correct answer is: 1/4

Question 3

Correct

Mark 1.00 out of 1.00

Let $F_1(\omega)$ denote the Fourier transforms of $x_1(t) = \frac{1}{1+jt}$. Which of the following options is correct ?

Select one:

- $F_1(\omega) = 2\pi e^{\omega} u(\omega)$
- $F_1(\omega) = 2\pi e^{\omega} u(-\omega)$ ✓
- $F_1(\omega) = 2\pi e^{-\omega} u(\omega)$
- $F_1(\omega) = e^{\omega} u(\omega)$
- $F_1(\omega) = e^{\omega} u(-\omega)$
- $F_1(\omega) = 2\pi e^{-\omega} u(-\omega)$
- None of the other options are correct

Your answer is correct.

The correct answer is: $F_1(\omega) = 2\pi e^{\omega} u(-\omega)$

Question 4

Correct

Mark 1.00 out of 1.00

The Fourier transform of a signal $x(t)$ is $\frac{\cos(\omega)}{(1+j\omega)^2}$. The signal $x(t)$ at $t=1$ is

Select one:

- e^{-1}
- None of the other choices are correct ✓
- $0.5e^{-2}$
- $2e^{-2}$

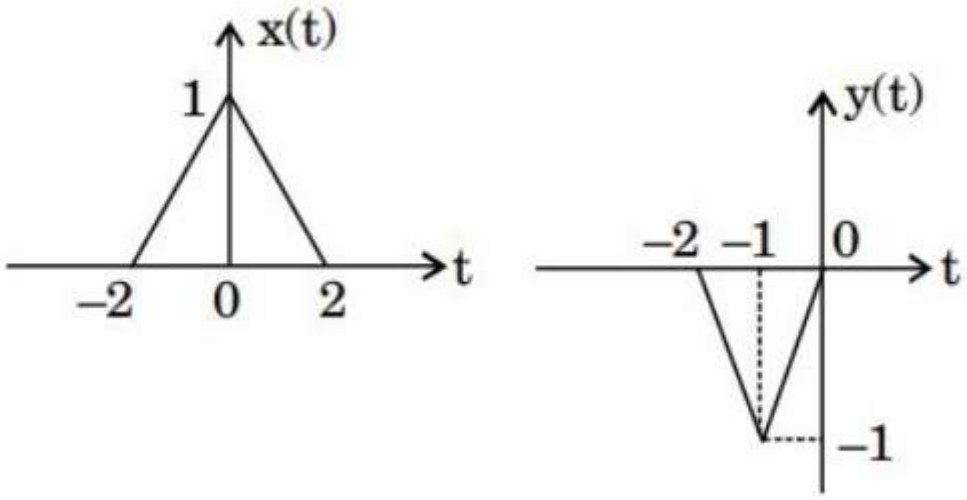
Your answer is correct.

The correct answer is: None of the other choices are correct

Question 5

Incorrect

Mark 0.00 out of 1.00



Let $x(t)$ and $y(t)$ (with Fourier transforms $X(f)$ and $Y(f)$ respectively) be related as shown in the figure. Then Y(f) is

Select one:

- $-\frac{1}{2}X(f/2)e^{-j2\pi f}$
- $-X(f/2)e^{j2\pi f}$
- None of the other choices are correct
- $-\frac{1}{2}X(f/2)e^{j2\pi f}$
- $-X(f/2)e^{-j\pi f}$
- $-X(f/2)e^{-j4\pi f}$
- $-X(f/2)e^{-j2\pi f}$

Your answer is incorrect.

The correct answer is: $-\frac{1}{2}X(f/2)e^{j2\pi f}$

Question 6

Incorrect

Mark 0.00 out of 1.00

Note that the Hilbert transform of a signal $x(t)$ is obtained by convolving it with $\frac{1}{\pi t}$. The Hilbert transform of $\cos(\omega_1 t) + \sin(\omega_2 t)$ is

Select one:

- $\sin(\omega_1 t) + j\cos(\omega_2 t)$
- $\sin(\omega_1 t) + \cos(\omega_2 t)$ ✘
- None of the other choices are correct
- $\sin(\omega_1 t) - j\cos(\omega_2 t)$
- $\sin(\omega_1 t) - \cos(\omega_2 t)$
- $\cos(\omega_1 t) + \sin(\omega_2 t)$
- $\cos(\omega_1 t) - \sin(\omega_2 t)$

Your answer is incorrect.

The correct answer is: $\sin(\omega_1 t) - \cos(\omega_2 t)$

Question 7

Correct

Mark 1.00 out of 1.00

The value of the integral $\int_{-\infty}^{\infty} 12\cos(2\pi t)\frac{\sin(4\pi t)}{4\pi t}dt$ is

Answer: 3 ✓

The correct answer is: 3

Question 8

Correct

Mark 1.00 out of 1.00

Fourier transform of $\frac{1}{4}[e^{-t}(1+2t)-e^{-3t}]u(t)$ is

Select one:

- None of the other choices are correct
- $\frac{j\omega+3}{-j\omega^3+3\omega^2-5j\omega+2}$
- $\frac{j\omega+3}{j\omega^3-\omega^2+5j\omega-2}$
- $\frac{j\omega+2}{j\omega^3+5\omega^2-7j\omega-3}$
- $\frac{j\omega+2}{-j\omega^3-5\omega^2+3j\omega+3}$
- $\frac{j\omega+2}{-j\omega^3-5\omega^2+7j\omega+3}$ ✓
- $\frac{j\omega+3}{j\omega^3-3\omega^2+5j\omega-2}$

Your answer is correct.

The correct answer is: $\frac{j\omega+2}{-j\omega^3-5\omega^2+7j\omega+3}$

Question 9

Correct

Mark 1.00 out of 1.00

If $X(\omega)$ is the Fourier transform of signal $x(t)=\frac{sin(t)sin(\frac{t}{2})}{\pi t^2}$, then $\int_{-\infty}^{\infty}X(\omega)d\omega$ is

Select one:

- 1/2
- 2
- None of the other choices are correct
- 1 ✓

Your answer is correct.

The correct answer is: 1

Question 10

Incorrect

Mark 0.00 out of 1.00

You are given four REAL signals $x_1(t)$, $x_2(t)$, $x_3(t)$ and $x_4(t)$. It is known that $x_1(t)$ and $x_3(t)$ are even symmetric and $x_2(t)$ and $x_4(t)$ are odd symmetric. A machine exists that can compute the Fourier transform of a complex signal fed to it. A student claims that using the machine ONLY ONCE, and using some simple operations, she can find the Fourier transforms of all the four signals. Which of the following statements is true?

Select one:

- False
- TRUE, all four transforms can be computed at all points
- True, but the transforms cannot be computed at isolated points like $\omega = 0$
- None of the other statements are correct

Your answer is incorrect.

The correct answer is: TRUE, all four transforms can be computed at all points

Question 11

Correct

Mark 1.00 out of 1.00

The power spectral density of a signal is the Fourier transform of its autocorrelation function. If the power spectral density is given by $[\sin(\omega)/\omega]^2$, the autocorrelation function of this signal is

Select one:

- a triangular pulse between -1 and 1
- a rectangular pulse between -1 and 1
- A sinc pulse
- a rectangular pulse between -2 and 2
- None of the other choices are correct
- a squared sinc pulse
- a triangular pulse between -2 and 2

Your answer is correct.

The correct answer is: a triangular pulse between -2 and 2

Question 12

Incorrect

Mark 0.00 out of 2.00

The Hilbert transform of a signal $x(t)$ is obtained by convolving it with $\frac{1}{\pi t}$. Let $x(t) = \sin(2\pi f_0 t)$ and $\hat{x}(t)$ denote its Hilbert transform. The signal $x(t)\cos(2\pi f_c t) + \hat{x}(t)\sin(2\pi f_c t)$ is

Select one:

- $\sin(2\pi(f_c + f_0)t) + \cos(2\pi(f_c + f_0)t)$
- $-\sin(2\pi(f_c - f_0)t)$
- $-\cos(2\pi(f_c + f_0)t)$
- None of the other choices are correct
- $\sin(2\pi(f_c + f_0)t)$ ✗
- $\cos(2\pi(f_c - f_0)t)$

Your answer is incorrect.

The correct answer is: $-\sin(2\pi(f_c - f_0)t)$

Question 13

Correct

Mark 2.00 out of 2.00

The integral $\int_{-\infty}^{\infty} \frac{1}{|1 + j\omega|^4} d\omega$ has a value

Select one:

- a. None of the other choices are correct ✓
- b. 4π
- c. 8π
- d. 2π

Your answer is correct.

The correct answer is: None of the other choices are correct

◄ Quiz II

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Quiz IV DTFT ►