Assignment 8

The due date for submitting this assignment has passed. **Due on 2018-09-26, 23:59 IST.**

As per our records you have not submitted this assignment.

1) **The solution of the integral equation** $\int_{0}^{\infty} f(x) \sin sx \, dx = e^{-s}$, is

- $\frac{2}{\pi(1 + x^2)}$
- $\frac{2x}{\pi(1 + x^2)}$
- $\frac{1}{\pi(1 + x^2)}$
- $x$

No, the answer is incorrect.

**Score:** 0

**Accepted Answers:**
- $\frac{2x}{\pi(1 + x^2)}$

2) **The solution of the integral equation** $\int_{0}^{\infty} f(x) \cos sx \, dx = \begin{cases} 
1, & 0 \leq s < 1 \\
2, & 1 \leq s < 2 \\
0, & s \geq 2
\end{cases}$ is

- $\frac{2}{\pi} (2 \sin 2x - \sin x)$
- $\frac{2}{\pi} (\sin 2x - 2 \sin)$
No, the answer is incorrect.
Score: 0
Accepted Answers:
\[ \frac{2}{\pi x} \left( 2 \sin 2x - \sin x \right) \]

The solution of the integral equation
\[ \int_0^\infty f(x) \sin sx \, dx = \begin{cases} 
1 - s, & 0 \leq s \leq 1 \\
0, & s > 1 \end{cases} \]
is
\[ \frac{2}{\pi x^2} (x - \sin x) \]

No, the answer is incorrect.
Score: 0
Accepted Answers:
\[ \frac{2}{\pi x^2} (x - \sin x) \]

The solution of the integral equation
\[ \cos 2s = \frac{1}{\pi} \int_{-\infty}^{\infty} \frac{f(t) \, dt}{s - t} \]
is equal to
\[ \cos 2t \]
\[ \sin 2t \]
\[ - \cos 2t \]
\[ - \sin 2t \]

No, the answer is incorrect.
Score: 0
Accepted Answers:
\[ \sin 2t \]

The solution of the integral equation
\[ \sin \frac{s}{2} = \frac{1}{\pi} \int_{-\pi}^{\pi} \frac{f(t) \, dt}{t - s} \]
is
\[ - \cos \frac{t}{2} \]
\[ \cos \frac{t}{2} \]
\[ - \sin \frac{t}{2} \]
6) The infinite Hilbert transform of the Dirac – delta function $\delta(t)$ is $1$ point

\[
\frac{1}{\pi s}
\]

No, the answer is incorrect.
Score: 0
Accepted Answers:
\[
\frac{1}{\pi s}
\]

7) Let a functional $I[y(x)]$ defined on the class $C'[0, 1]$ be given by $1$ point

\[
I[y(x)] = \int_0^1 [1 + y(x) + y'^2(x)]dx,
\]
then which one is not false.

\[
I[x] = \frac{3}{2}
\]
\[
I[1] = 1
\]
\[
I[x^2] = \frac{8}{3}
\]
\[
\]

No, the answer is incorrect.
Score: 0
Accepted Answers:
\[
I[x^2] = \frac{8}{3}
\]

8) Let $a$ and $b$ be two constants and $y \in C'[a, b]$. Consider $I[y] = \int_a^b [1 + y^2 + y'^2]dx$ and $J[y] = \frac{\int_a^b (y+\xi')dx}{\int_a^b (1+y'^2)dx}$. Then $1$ point

\[
I \text{ is linear but not a non local functional}
\]
\[
J \text{ is linear and a non local functional}
\]
9) Let \( y \in C'[a, b] \), where \( a \) and \( b \) are two constants such that \( a < b \). Consider \( I[y] = y'^2 \) and \( J[y] = \int_a^b (2 + \sqrt{y(x)}) \, dx \). Then

- Both \( I \) and \( J \) are linear functionals
- Neither \( I \) nor \( J \) is a linear functional
- \( I \) is a linear functional
- \( J \) is a linear functional.

No, the answer is incorrect.
Score: 0
Accepted Answers:
- \( I \) is a linear functional

10) Consider the statements

(A) Every problem of geodesics may be considered as an isoperimetric problem.
(B) Every isoperimetric problem may be considered as a problem of geodesics

Then

- only (A) is true
- only (B) is true
- both (A) and (B) are true
- both (A) and (B) are false.

No, the answer is incorrect.
Score: 0
Accepted Answers:
- only (A) is true