Assignment 11

The due date for submitting this assignment has passed. Due on 2018-10-17, 23:59 IST.
As per our records you have not submitted this assignment.

1) The shortest distance from the point \((-1, 5)\) to the parabola \(y^2 = x\) is

- \(\sqrt{5}\)
- \(2\)
- \(2\sqrt{5}\)
- \(2\sqrt{2}\)

No, the answer is incorrect.
Score: 0
Accepted Answers:
- \(2\sqrt{5}\)

2) The shortest distance between the circle \(x^2 + y^2 = 1\) and the straight line \(x + y = 4\)

- \(2\sqrt{2}\)
- \(2\sqrt{2} + 1\)
- \(3\)
- \(2\sqrt{2} - 1\)

No, the answer is incorrect.
Score: 0
Accepted Answers:

© 2014 NPTEL - Privacy & Terms - Honor Code - FAQs -
Integral Equations, calculus of variations and its...

4) The extremal of the functional

\[ I[y(x)] = \int_{0}^{\pi} (y'^2 - y^2 + 4y\sin^2 x)\, dx; \quad y(0) = y\left(\frac{\pi}{2}\right) = \frac{1}{3} \]

is given by

- \( y(x) = \frac{\sin x + \cos x}{3} \)
- \( y(x) = \frac{2\sin x + \cos 2x}{3} \)
- \( y(x) = \frac{-2\sin x - \cos 2x + 2}{3} \)

None of these.

No, the answer is incorrect.
Score: 0
Accepted Answers:
- \( r = \sec(\theta \sin \alpha + b); \quad a \text{ and } b \text{ are arbitrary constants} \)

5) The extremal of the functional

\[ I[y(x)] = \int_{0}^{2} y'^2\, dx; \quad y(0) = 0, \quad y(2) = 1 \]

and subjected to the condition \( \int_{0}^{2} y\, dx = 1 \) is given by

- \( y(x) = \frac{x}{2} \)
- \( y(x) = \frac{x(x+2)}{8} \)
- \( y(x) = \sin \pi x \)

None of these.

No, the answer is incorrect.
Score: 0
Accepted Answers:
- \( y(x) = \frac{x}{2} \)
The extremal of the functional
\[ I[y(x)] = \int_0^1 (x^2 + y^2) \, dx \; ; \; y(0) = 0, \; y(1) = 0 \]
and subjected to the condition \( \int_0^1 y^2 \, dx = 2 \) is given by

\( y(x) = \sin m\pi x; \; m \in \mathbb{Z} \)
\( y(x) = \cos m\pi x; \; m \in \mathbb{Z} \)
\( y(x) = \sin 2m\pi x; \; m \in \mathbb{Z} \)

None of these.

No, the answer is incorrect.
Score: 0
Accepted Answers: None of these.

7) The solid figure of revolution of given volume, which passes through the origin and extremizes its surface is

- Cylinder
- Sphere
- Cone
- None of these.

No, the answer is incorrect.
Score: 0
Accepted Answers: Sphere

8) The extremal of the functional \( I[y(x)] = \int_0^a \pi y^2 \, dx \; ; \; y(0) = 0, \; y(a) = 0 \), and subjected to the condition \( \int_0^a 2\pi y \sqrt{1 + y'^2} \, dx = \text{constant} \) is given by

\[ y^2 + x^2 = \alpha^2 \]
\[ (y - \alpha)^2 + x^2 = \alpha^2 \]
\[ (x - \alpha)^2 + y^2 = \alpha^2 \]

None of these.

No, the answer is incorrect.
Score: 0
Accepted Answers: \( (x - \alpha)^2 + y^2 = \alpha^2 \)

9)
The differential equation for the extremal of the iso-perimetric problem $I[y(x)] = \int_0^a (x^2 y'^2 + y^2) \, dx$ with boundary conditions $y(0) = 0 = y(a)$ and subjected to the condition $\int_0^a x^2 y^2 \, dx = 1$, is ($\lambda$ being a constant)

- $x^2 y'' + xy' + (\lambda x^2 - 1)y = 0$
- $x^2 y'' + 2xy' + (\lambda x - 1)y = 0$
- $x^2 y'' + 2xy' - (\lambda x^2 + 1)y = 0$

None of these.

No, the answer is incorrect.
Score: 0
Accepted Answers:
$x^2 y'' + 2xy' - (\lambda x^2 + 1)y = 0$

1 point

Extremal of the functional $I[y(x)] = \int_a^b (y \sqrt{1 + y'^2}) \, dx$; $y(a) = y_1$, $y(b) = y_2$ and subjected to the condition $\int_a^b \sqrt{1 + y'^2} \, dx = l$ is ($c_1$, $c_2$ and $\lambda$ are suitable constants)

- $y(x) + \lambda = c_1 \cosh \frac{x - c_2}{c_1}$
- $y(x) + \lambda = c_1 \sinh \frac{x - c_2}{c_1}$
- $y(x) = \lambda c_1 \sinh(x - c_1)$

None of these.

No, the answer is incorrect.
Score: 0
Accepted Answers:
$y(x) + \lambda = c_1 \cosh \frac{x - c_2}{c_1}$