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NPTEL

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Courses » **Integral Equations,calculus of variations and its applications**

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Unit 12 - Week 11

Course outline

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

- $\sqrt{5}$
- 2
- $2\sqrt{5}$
- $2\sqrt{2}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$2\sqrt{5}$

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

- $2\sqrt{2}$
- $2\sqrt{2} + 1$
- 3
- $2\sqrt{2} - 1$

No, the answer is incorrect.
Score: 0

- $r = a\sec(\theta\sin\alpha + b);\ a \text{ and } b \text{ are arbitrary constants}$
- $r = a\cos(\theta\sin\alpha + b);\ a \text{ and } b \text{ are arbitrary constants}$
- $r = a\sec(\theta\cos\alpha + b);\ a \text{ and } b \text{ are arbitrary constants}$
- *None of these.*

No, the answer is incorrect.
Score: 0

Accepted Answers:
$r = a\sec(\theta\sin\alpha + b);\ a \text{ and } b \text{ are arbitrary constants}$

4) *The extremal of the functional* **1 point**

$I[y(x)] = \int_0^{\frac{\pi}{2}} (y'^2 - y^2 + 4y\sin^2 x)dx;\ y(0) = y\left(\frac{\pi}{2}\right) = \frac{1}{3}$

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:
None of these.

5) *The extremal of the functional* **1 point**

$I[y(x)] = \int_0^2 y'^2 dx;\ y(0) = 0,\ y(2) = 1$

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:
$y(x) = \frac{x}{2}$

6) **1 point**

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 origin and extremizes its surface is* ***1 point***

- Cylinder
- *Sphere*
- *Cone*
- *None of these.*

No, the answer is incorrect.
Score: 0

Accepted Answers:
Sphere

8) ***1 point***
The extremal of the functional $I[y(x)] = \int_0^a \pi y^2 dx;\ y(0) = 0,\ y(a) = 0,$ *and subject to the condition* $\int_0^a 2\pi y\sqrt{1 + y'^2}dx =$ *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) ***1 point***

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

- $x^2y'' + xy' + (\lambda x^2 - 1)y = 0$
- $x^2y'' + 2xy' + (\lambda x - 1)y = 0$
- $x^2y'' + 2xy' - (\lambda x^2 + 1)y = 0$
- $None\ of\ these.$

No, the answer is incorrect.
Score: 0

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

10) ***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:
$y(x) + \lambda = c_1 \cosh \frac{x-c_2}{c_1}$

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