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NPTEL

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Courses » Integral Equations,calculus of variations and its applications

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Unit 13 - Week 12

Course outline

Assignment 12

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2018-10-24, 23:59 IST.

1) *The shortest distance between the parabola* $y = x^2$ *and the straight line* $y = x - 5$ *is* — *1 point*

- $\frac{19}{8}$
- $\frac{19\sqrt{2}}{8}$
- $\frac{9\sqrt{2}}{8}$
- $\frac{9\sqrt{3}}{8}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\frac{19\sqrt{2}}{8}$

2) *The shortest distance of an interior point* $(1,1)$ *from the circle* $(x-2)^2 + y^2 = 9,$ *is* — *1 point*

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

No, the answer is incorrect.
Score: 0

Accepted Answers:
$3 - \sqrt{2}$

3) — *1 point*
The curve along which the shortest distance between the parabola $y^2 = 4x$ *and the line* $x + y + 5 = 0$ *occurs, is*

- $y = x - 3$
- $y = x + 3$
- $y = x$
- $y = x - 1$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$y = x - 3$

$y = x + 1$

$y = 2(x - 1)$

$y = 2x - 1$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$y = 2(x - 1)$

5) *The curves on which an extremum* $I[y] = \int_0^{10} y'^3 dx, \; y(0) = 0, \; y(10) = 0$ *can be achieved provided that the permissible curves can not pass inside the area bounded by the circle* $(x-5)^2 + y^2 = 9,$ *are given by* **1 point**

$$\begin{cases} \pm \frac{3}{4}\, x, & \text{for } 0 \le x \le \frac{16}{5} \\ \pm\sqrt{9-(x-5)^2}, & \text{for } \frac{16}{5} < x \le \frac{34}{5} \\ \pm \frac{1}{4}\,(x-10), & \text{for } \frac{34}{5} < x \le 10 \end{cases}$$

$$\begin{cases} \pm \frac{1}{4}\, x, & \text{for } 0 \le x \le \frac{16}{5} \\ \pm\sqrt{9-(x-5)^2}, & \text{for } \frac{16}{5} < x \le \frac{34}{5} \\ \pm \frac{3}{4}\,(x-10), & \text{for } \frac{34}{5} < x \le 10 \end{cases}$$

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$$\begin{cases} \pm \frac{1}{4}\, x, & \text{for } 0 \le x \le \frac{16}{5} \\ \pm\sqrt{9-(x-5)^2}, & \text{for } \frac{16}{5} < x \le \frac{34}{5} \\ \pm \frac{1}{4}\,(x-10), & \text{for } \frac{34}{5} < x \le 10 \end{cases}$$

No, the answer is incorrect.
Score: 0

Accepted Answers:

$$\begin{cases} \pm \frac{3}{4}\, x, & \text{for } 0 \le x \le \frac{16}{5} \\ \pm\sqrt{9-(x-5)^2}, & \text{for } \frac{16}{5} < x \le \frac{34}{5} \\ \pm \frac{3}{4}\,(x-10), & \text{for } \frac{34}{5} < x \le 10 \end{cases}$$

6) *The extremal of the shortest distance between two fixed points* $(2,2)$ *and* $(2,-2)$ *located in the region* $y^2 \ge x,$ *is* **1 point**

$$x = \begin{cases} -y(4-2\sqrt{2}) - (6-4\sqrt{2}), & -2 \le y \le -2+\sqrt{2} \\ y^2, & -2+\sqrt{2} \le y \le 2-\sqrt{2} \\ y(4-2\sqrt{2}) - (6-4\sqrt{2}), & 2-\sqrt{2} \le y \le 2 \end{cases}$$

$$x = \begin{cases} -y(2-\sqrt{2}) - (3-2\sqrt{2}), & -2 \le y \le -2+\sqrt{2} \\ y^2, & -2+\sqrt{2} \le y \le 2-\sqrt{2} \\ y(2-\sqrt{2}) - (3-2\sqrt{2}), & 2-\sqrt{2} \le y \le 2 \end{cases}$$

$$x = \begin{cases} -y(2+\sqrt{2}) - (3+2\sqrt{2}), & -2 \le y \le -2+\sqrt{2} \\ y^2, & -2+\sqrt{2} \le y \le 2-\sqrt{2} \\ y(2+\sqrt{2}) - (3+2\sqrt{2}), & 2-\sqrt{2} \le y \le 2 \end{cases}$$

$$x = \begin{cases} -y(2-\sqrt{2}) - (3+2\sqrt{2}), & -2 \le y \le -2+\sqrt{2} \\ y^2, & -2+\sqrt{2} \le y \le 2-\sqrt{2} \\ y(2-\sqrt{2}) - (3+2\sqrt{2}), & 2-\sqrt{2} \le y \le 2 \end{cases}$$

No, the answer is incorrect.
Score: 0

Accepted Answers:

$$x = \begin{cases} -y(4-2\sqrt{2}) - (6-4\sqrt{2}), & -2 \le y \le -2+\sqrt{2} \\ y^2, & -2+\sqrt{2} \le y \le 2-\sqrt{2} \\ y(4-2\sqrt{2}) - (6-4\sqrt{2}), & 2-\sqrt{2} \le y \le 2 \end{cases}$$

7) **1 point**

$The\ extremal\ of\ the\ functional\ I[y(x), z(x)] = \int_{x_1}^{x_2} (y'z' + 2y'^2 + 2z'^2)dx\ with\ y(0) = 0,\ z(0) = 0$
$where\ the\ point\ (x_2, y_2, z_2)\ moves\ over\ the\ fixed\ plane\ x = x_2\ and\ \cos 2x_2 = 0,\ is\ given\ by$

- $y = c\sin x, z = -c\sin x$
- $y = 0, z = 0$
- $y = c\cos 2x, z = -c\cos 2x$
- $y = c\sin 2x, z = -c\sin 2x$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$y = c\sin x, z = -c\sin x$

8) $The\ shortest\ distance\ from\ the\ point\ (0, 2, 1)\ to\ the\ straight\ line$ *1 point*
$\frac{x}{1} = \frac{y}{2} = \frac{z}{3},\ is$

- $\frac{\sqrt{6}}{2}$
- $\frac{2\sqrt{6}}{3}$
- $\frac{\sqrt{6}}{3}$
- $\frac{3\sqrt{6}}{2}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\frac{\sqrt{6}}{2}$

9) $Let\ T\ and\ V\ denote\ the\ Kinetic\ energy\ and\ potential\ energy\ of\ a\ particle\ in\ a\ force$ *1 point*
$field\ \vec{f}.\ If\ \vec{f}\ is\ conservative\ then$

- $\vec{f}.\delta\vec{r} = \delta V$
- $\vec{f}.\delta\vec{r} = -\delta V$
- $\vec{f}.\delta\vec{r} = \delta T$
- $\vec{f}.\delta\vec{r} = -\delta T$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\vec{f}.\delta\vec{r} = -\delta V$

10) *1 point*
$Let\ T\ and\ V\ be\ the\ Kinetic\ energy\ and\ potential\ energy\ of\ a\ particle.\ If\ the\ force\ field\ \vec{f}\ is\ conservative\ then\ the\ H$
$principle\ takes\ the\ form$

- $\delta\int_{t_1}^{t_2}(T - V)dt = 0$
- $\delta\int_{t_1}^{t_2}(T + V)dt = 0$
- $\int_{t_1}^{t_2}\left(\delta T + \vec{f}.\delta\vec{r}\right)dt = 0$
- $none\ of\ these$

No, the answer is incorrect.
Score: 0

Accepted Answers:

$\delta \int_{t_1}^{t_2} (T - V)dt = 0$

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