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NPTEL

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Courses » Integral Equations,calculus of variations and its applications

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# Unit 10 - Week 9



## Assignment 9

**The due date for submitting this assignment has passed.** **Due on 2018-10-03, 23:59 IST.**
**As per our records you have not submitted this assignment.**

1) *1 point*

$The\ extremal\ of\ the\ functional\ \int_0^{\frac{\pi}{4}}(\dot{x}\dot{y}+2x^2+2y^2)dt\ subject\ to\ the\ conditions$
$x(0)=y(0)=0,\ x(\frac{\pi}{4})=y(\frac{\pi}{4})=1\ is$

- $x=y=\sin t$
- $x=\sin t,\ y=1-\cos t$
- $x=\sin^2 t,\ y=1-\cos 3t$
- $x=y=cosech(\frac{\pi}{2})\sinh 2t$

**No, the answer is incorrect.**
**Score: 0**

**Accepted Answers:**
$x=y=cosech(\frac{\pi}{2})\sinh 2t$

2) $The\ extremal\ of\ the\ functional\ \int_0^1(y'^2+z'^2)dt\ that\ satisfy\ the\ boundary$ *1 point*
$conditions\ y(0)=z(0)=0,\ y(1)=1,\ z(1)=2,\ is$

- $y=x^2,\ z=2x$
- $y=x,\ z=2x$
- $y=sin\left(\frac{\pi x}{2}\right),\ z=2\left(1-\cos\frac{\pi x}{2}\right)$
- $y=x,\ z=2x^2$

**No, the answer is incorrect.**

Week 12

WEEKLY FEEDBACK

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$\alpha = 0 \text{ and } \gamma \neq 0$

$\alpha = 0 \text{ and } \gamma = 0$

$\beta = 0 \text{ and } \gamma = 0$

$\beta = 0 \text{ and } \delta = 0$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\alpha = 0 \text{ and } \gamma = 0$

4) **1 point**

Consider the functional $I[y(x)] = \int_0^1 (12xy + y'^2)dx$ with $y(0) = 0$ and $y(1) = 0.$ Then

*it has no solution*

*it has a unique solution given by* $y(x) = x^2(x-1)$

*it has infinitely many solutions*

*it has a unique solution given by* $y(x) = x(x^2-1)$

No, the answer is incorrect.
Score: 0

Accepted Answers:
*it has a unique solution given by* $y(x) = x(x^2-1)$

5) **1 point**

Consider the functional $I[y(x)] = \int_0^1 xyy'dx$ with $y(0) = 0$ and $y(1) = 1,$ then

*it has only one extremal* $y(x) = x(x-1)$

*it has no extremal*

*every differentiable function satisfying the boundary conditions is an extremal*

*it has only one extremal given by* $y(x) = x(x^2-1).$

No, the answer is incorrect.
Score: 0

Accepted Answers:
*it has no extremal*

6) **1 point**

Consider the functional $I[y(x)] = \int_0^\pi [y'^2 - y^2 + 4y\cos x]dx;\ y(0) = 0,\ y(\pi) = 0.$ Then it

*no extremal*

*only two extremals*

*infinitely many extremals*

- $a\ unique\ extremal\ given\ by\ y(x) = x \sin x.$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$infinitely\ many\ extremals$

7) $Consider\ the\ functional\ I[y(x)] = \int_a^b (y + xy')dx.\ Then$ **1 point**

- $it\ has\ only\ one\ extremal$
- $it\ has\ exactly\ two\ extremals$
- $every\ differentiable\ function\ satisfying\ the\ boundary\ conditions\ is\ an\ extremal\ cur$
- $None\ of\ these$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$every\ differentiable\ function\ satisfying\ the\ boundary\ conditions\ is\ an\ extremal\ curv$

8) $Consider\ the\ functionals\ I[y(x)] = \int_0^1 (2e^y - y^2)dx;\ y(0) = 1,\ y(1) = e\ and$ **1 point**

$J[y(x)] = \int_0^{\frac{\pi}{2}} y(2x - y)dx;\ y(0) = 0,\ y\left(\frac{\pi}{2}\right) = \pi. Then$

- $Both\ I\ and\ J\ has\ no\ extremal$
- $I\ has\ a\ unique\ extremal\ but\ J\ has\ no\ extremal$
- $J\ has\ a\ unique\ extremal\ but\ I\ has\ no\ extremal$
- $Both\ I\ and\ J\ has\ unique\ extremal.$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$Both\ I\ and\ J\ has\ no\ extremal$

9) **1 point**
$Consider\ the\ functional\ I[y(x)] = \int_0^1 (x - y')^2 dx.\ Then\ the\ curve\ for\ which\ the\ functior$
$can\ be\ extremized\ is\ given\ by$

- $y(x) = \frac{x}{2} + x^2$
- $y(x) = \frac{x^2}{2} + x$
- $y(x) = \frac{x - 2x^2}{2}$
- $y(x) = \frac{2x - x^2}{2}$

No, the answer is incorrect.
Score: 0

Accepted Answers:

$y(x) = \frac{x^2}{2} + x$

10) **1 point**

$Curve\ for\ which\ the\ functional\ I[y(x)] = \int_a^b \frac{1}{y} \sqrt{1+y'^2} dx\ can\ be\ extremized\ is\ given\ by$

- $(x-h)^2 + y^2 = k^2$
- $x^2 + (y-k)^2 = 1$
- $(x-h)^2 + (y-k)^2 = 1$
- $hx^2 + ky^2 = 1$

**No, the answer is incorrect.**
**Score: 0**

**Accepted Answers:**
$(x-h)^2 + y^2 = k^2$

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