Assignment 3

The due date for submitting this assignment has passed.

Due on 2021-02-10, 23:59 IST.

As per our records you have not submitted this assignment.

1) Which of the following is the form of extremals of the functional *1 point*

$$F\{y(x), z(x)\} = \int_{x_0}^{x_1} (8yz - 5y^2 + y'^2 - 4z'^2)dx$$

- $y(x) = 4A\cos 2x - 4B\sin 2x - C\cos x - D\sin x$
- $y(x) = 4A\cos 2x + 4B\sin 2x + C\cos x + D\sin x$
- $y(x) = 2A\cos 2x + 2B\sin 2x + 4C\cos x + D\sin x$
- $y(x) = 4A\cos 2x + 2B\sin 2x + 2C\cos x + 2D\sin x$
- $y(x) = 2A\cos 2x + 4B\sin 2x - C\cos x + D\sin x$
- $y(x) = 2A\cos 2x - 4B\sin 2x - C\cos x - D\sin x$

where A, B, C and D are constants

No, the answer is incorrect.
Score: 0
Accepted Answers:
$y(x) = 4A\cos 2x + 4B\sin 2x + C\cos x + D\sin x$

2) Find the extremal of the following functional *1 point*

$$F\{y\} = \int_0^1 (y''^2 - 360x^2 y)dx$$

subject to $y(0) = 0$, $y'(0) = 1$, $y(1) = 1$ and $y'(1) = 5/2$

- $y(x) = \frac{1}{3}x^4 - \frac{1}{2}x^2 + x$
- $y(x) = \frac{1}{2}x^4 - \frac{1}{3}x^2 + x$
- $y(x) = \frac{1}{2}x^4 + \frac{1}{2}x^2 - x$
- $y(x) = \frac{1}{3}x^6 - \frac{1}{2}x^3 + x$
- $y(x) = \frac{1}{2}x^6 - \frac{1}{3}x^3 - x$
- $y(x) = \frac{1}{2}x^6 - \frac{1}{2}x^3 + x$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$y(x) = \frac{1}{2}x^6 - \frac{1}{2}x^3 + x$

3) Determine the equation of the shortest arc in the first quadrant which passes through the points (0, 0) and (1, 0) and encloses a prescribed area A with the x-axis, where $A \leq \frac{\pi}{8}$ *1 point*

- $(x-k)^2 + \left(y + \frac{1}{2}\right)^2 = k^2 + \frac{1}{4}$
- $(x+k)^2 + \left(y - \frac{1}{2}\right)^2 = k^2 + \frac{1}{4}$
- $(x+k)^2 + \left(y + \frac{1}{2}\right)^2 = k^2 - \frac{1}{4}$
- $\left(x + \frac{1}{2}\right)^2 + (y-k)^2 = k^2 + \frac{1}{4}$
- $\left(x - \frac{1}{2}\right)^2 + (y+k)^2 = k^2 + \frac{1}{4}$
- $\left(x - \frac{1}{2}\right)^2 + (y-k)^2 = k^2 - \frac{1}{4}$

where k is constant

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\left(x - \frac{1}{2}\right)^2 + (y+k)^2 = k^2 + \frac{1}{4}$