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

\[ F[y(x), z(x)] = \int_{a}^{b} \left( 8y^2 - 5y^3 + 4y^4 \right) dx \]

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

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

\[ F[y] = \int_{a}^{b} \left( 3y'^2 - 36x^2 y'^2 \right) dx \]

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

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

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

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 \( A \leq \frac{1}{4} \)

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

where \( k \) is constant

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