Assignment 1

The due date for submitting this assignment has passed.

Due on 2021-02-03, 23:59 IST.

As per our records you have not submitted this assignment.

1) Consider the functional *1 point*

$$J(y) = \int_0^1 (1+x)(y')^2 dx$$

where y is twice continuously differentiable and $y(0) = 0$ and $y(1) = 1$. Of all functions of the form

$$y(x) = x + c_1 x(1-x) + c_2 x^2(1-x)$$

Where c_1 and c_2 are constants, If we minimizes J, Then which of the following option is / are correct

- $y = \frac{186}{131}x - \frac{77}{131}x^2 + \frac{20}{131}x^3$
- $y = \frac{186}{131}x + \frac{77}{131}x^2 - \frac{20}{131}x^3$
- $y = \frac{186}{131}x + \frac{77}{131}x^2 + \frac{20}{131}x^3$
- $y = \frac{146}{151}x - \frac{97}{151}x^2 + \frac{20}{151}x^3$
- $y = \frac{146}{151}x + \frac{97}{151}x^2 - \frac{20}{151}x^3$
- $y = \frac{146}{151}x + \frac{97}{151}x^2 + \frac{20}{151}x^3$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$y = \frac{186}{131}x - \frac{77}{131}x^2 + \frac{20}{131}x^3$

2) Let $f = x^2 + y^2 + z^2$ subject to *1 point*

$$\phi = xy + 1 - z = 0$$

Then Which of the following is / are correct options

- Minimum of f is 1
- Minimum of f is 2
- Minimum of f is 1 at (1, 0, 0)
- Minimum of f is 1 at (0, 0, 1)
- Minimum of f is 2 at (0, 0, $\sqrt{2}$)
- Minimum of f is 2 at (1, 0, 1)

No, the answer is incorrect.
Score: 0

Accepted Answers:
Minimum of f is 1
Minimum of f is 1 at (0, 0, 1)

3) Of all parabolas which pass through the points (0, 0) and (1, 1), determine that one which, when rotated about the x-axis, generates a solid of revolution with least possible volume between $x = 0$ and $x = 1$ [Notice that the equation may be taken in the form $y = x + cx(1-x)$, when c is to be determined] *1 point*

- minimum volume is $\frac{\pi}{2}$
- minimum volume is $\frac{\pi}{4}$
- minimum volume is $\frac{\pi}{8}$
- minimum volume is $\frac{3\pi}{8}$
- minimum volume is $\frac{5\pi}{16}$
- minimum volume is $\frac{7\pi}{15}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
minimum volume is $\frac{\pi}{8}$