Submission Deadline : 28/10/2020 09:58

First Quiz C

Q.1 [MCQ, 3 Marks, Put the correct option(s) in the Box] Which of the following statement(s) is (are) true.

a) The function $f : [0, 1] \to \mathbb{R}$ defined as $f(x) = \frac{1}{n}$, on $x \in (\frac{1}{n+1}, \frac{1}{n}]$, $\forall n \in \mathbb{N}$ and $f(0) = 0$, is not piecewise continuous.
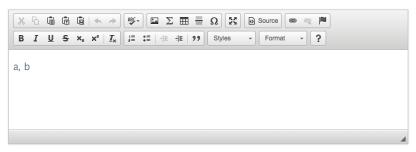
b) The function $f : [0, 1] \to \mathbb{R}$ defined as $f(x) = x \sin(\frac{1}{x})$, $x \neq 0$ and $f(0) = 0$, is piecewise continuous.

c) If the fundamental period of f is 2, then the fundamental period of f^{2020} is also 2.

d) None of the above.

This is a long answer type question. You can either upload a file or type your answer below.
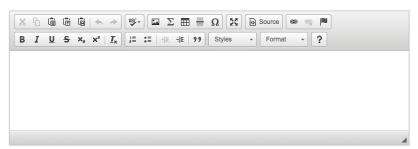
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or

a, b

Q.2 [Descriptive Question, 5 Marks] Consider the function $f(x) = 1$ on $(-\frac{\pi}{2}, \frac{\pi}{2})$, and $f(x) = 0$ on $[-\pi, -\frac{\pi}{2}] \cup [\frac{\pi}{2}, \pi]$. Using this function find the value of the following series:

$$\sum_{n=0}^{\infty} \frac{\sin^2\left(\frac{(2n+1)\pi}{2}\right)}{(2n+1)^2}$$

This is a long answer type question. You can either upload a file or type your answer below.

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Q.3 [MCQ, 3 Marks, Put the correct option(s) in the Box] Consider the function $f(x) = \sin^2(x)$ on real line. Then

a). fundamental period of f is 2π.

b). f is not a periodic function.

c). fundamental period of f is π

d). f is an infinitely many times differentiable function.

e). None of the above.

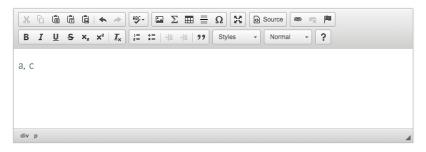This is a long answer type question. You can either upload a file or type your answer below.

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c, d

Q.4 [MCQ, 3 Marks, Put the correct option(s) in the Box] Consider the function
$f(x) = x^2 + x^3$ on $[0, 2]$. Let $h(x)$ and $g(x)$ denote its Fourier even series and odd series
respectively. Then

a) $h(3) = 2$

b) $h(3) = 36$

c) $g(3) = -2$

d) g(3) = -36

e) None of the above.

This is a long answer type question. You can either upload a file or type your answer below.

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or

a, c

div p

Q.5 [Descriptive question, 5 Marks] Consider the function defined by
$f(x) = -x, \ on \ x \in (-\pi, 0), \ and \ f(x) = x - \pi \ on \ x \in [0, \pi)$.

1. Calculate the Fourier coefficients $a_0, a_n \ and \ b_n$, of f.

2. Hence find the value of the series $1 + \frac{1}{3^2} + \frac{1}{5^2} + \frac{1}{7^2} + \frac{1}{9^2} + \cdots$

This is a long answer type question. You can either upload a file or type your answer below.

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or

div p

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