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Submission Deadline : 28/10/2020 09:58

First Quiz B

Q.1 *[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:

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

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

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Q.2 *[MCQ Question , 3 Marks, Write the correct option(s) in the box]*

Consider the function $f(x) = |sin(x) + cos(x)|$ on real line. Then,

a) f is a periodic function.

b) fundamental period of f is 2π.

c) f is a differentiable function.

d) fundamental period of f is π

e) None of the above.

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a, d

Q.3 *[MCQ Question , 3 Marks, Write 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 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} need not be 2.

d) None of the above.

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b, c

Q.4 ***[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 $1 + \frac{1}{3^2} + \frac{1}{5^2} + \frac{1}{7^2} + \frac{1}{9^2} + \cdots$

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Q.5 ***[MCQ Question, 3 Marks, Write the correct option(s) in the box]***

Consider the function $f(x) = e^x - 1$ on $[0, \pi]$. Let $h(x)$ and $g(x)$ denote its Fourier even series and odd series respectively. Then

a) $h(\frac{5\pi}{4}) = e^{\frac{3\pi}{4}} - 1$

b) $h(\frac{5\pi}{4}) = e^{-\frac{\pi}{4}}$

c) $g(\frac{5\pi}{4}) = e^{\frac{\pi}{4}}$

d) $g(\frac{5\pi}{4}) = 1 - e^{\frac{3\pi}{4}}$

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

Source | Styles | Format | ?

a, d

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