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- [Announcements](#)
- [Resources](#)
- [Forums](#)
- [Hangout](#)
- [My Profile](#)
- [Logout](#)
- [Help](#)
- [Feedback](#)
- [Back to Portal](#)

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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]

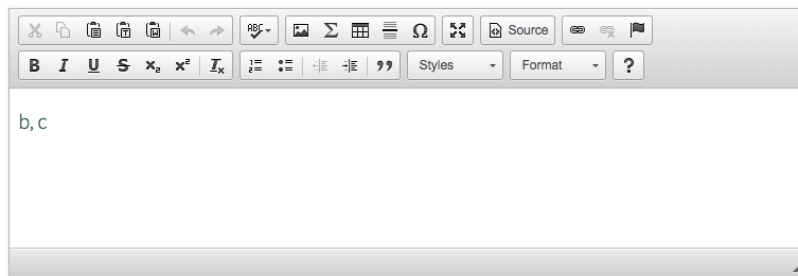
Which of the following statement(s) is (are) true.

- a) The function $f : [0, 1] \rightarrow \mathbb{R}$ 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 $f : [0, 1] \rightarrow \mathbb{R}$ 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

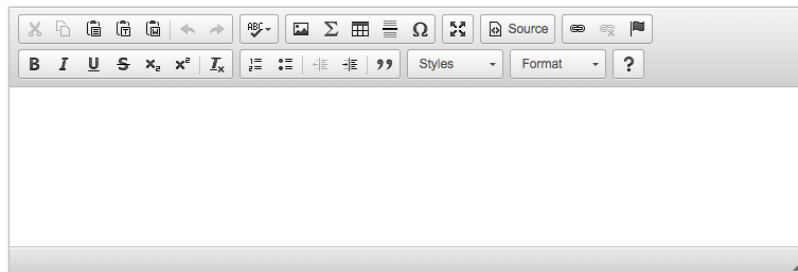
$f(x) = -x$, on $x \in (-\pi, 0)$, and $f(x) = x - \pi$ on $x \in [0, \pi)$.

1. Calculate the Fourier coefficients a_0, a_n and b_n , of f .
2. Hence find the value of the series $1 + \frac{1}{3^2} + \frac{1}{5^2} + \frac{1}{7^2} + \frac{1}{9^2} + \dots$

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

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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

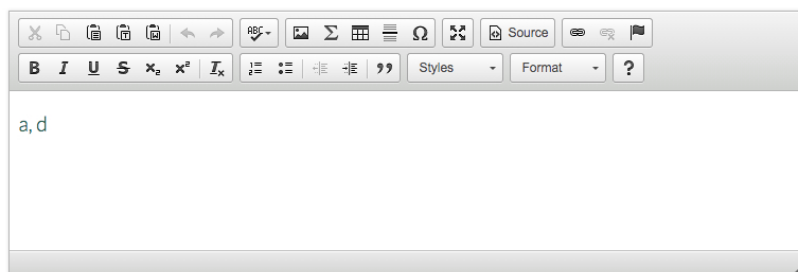
- a) $h\left(\frac{5\pi}{4}\right) = e^{\frac{3\pi}{4}} - 1$
- b) $h\left(\frac{5\pi}{4}\right) = e^{-\frac{\pi}{4}}$
- c) $g\left(\frac{5\pi}{4}\right) = e^{\frac{\pi}{4}}$
- d) $g\left(\frac{5\pi}{4}\right) = 1 - e^{\frac{3\pi}{4}}$

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



a, d

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