MA 101 (Mathematics I)
Quiz - 2
Maximum Marks : 10

Date : November 09, 2017   **Time :** 8 am - 8:50 am

No mark will be given for writing only TRUE or FALSE (without justification) in Question 1.

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1. State TRUE or FALSE giving proper justification for each of the following statements. [**2 × 2**]

    (a) If (x_n) and (y_n) are sequences in $\mathbb{R}$ such that $\lim\limits_{n\to\infty} (x_n + y_n) = 0$, then $\lim\limits_{n\to\infty} (x_n^3 + y_n^3)$ must be equal to 0.

    (b) There exists a continuous function $f : \mathbb{R} \to \mathbb{R}$ such that $f(\sin n) = \dfrac{n\pi}{2}$ for all $n \in \mathbb{N}$.

2. If $x_1 = 2$ and $x_{n+1} = \dfrac{x_n^2 + 3}{2x_n}$ for all $n \in \mathbb{N}$, then examine whether the sequence (x_n) is convergent. [**2**]

3. Determine all $p \in \mathbb{R}$ for which the series $\displaystyle\sum_{n=1}^{\infty} \dfrac{n^2 + 2n}{(2n^4 + 1)^p}$ is convergent. [**2**]

4. Examine whether $\lim\limits_{x\to 0} \left(\sin^2 \dfrac{1}{x} + \cos^4 \dfrac{1}{x} \right)$ exists (in $\mathbb{R}$). [**2**]

——————— **END** ———————