MA549: Topology   Quiz - I
Instructor: Rajesh Srivastava   November 15, 2023
Time duration: 1.5 hours   Maximum Marks: 10

N.B. Answer without proper justification will attract zero mark.

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1. (a) Let $A \subseteq Y \subseteq X$. Is it true that A is compact in X if and only if A is compact in Y? $\boxed{1}$

   (b) Whether continuous surjection sends Hausdorff space to Hausdorff space? $\boxed{1}$

2. Find an open cover of open ball $B(x, r)$ in $\mathbb{R}^n (n \geq 2)$, endowed with Euclidean topology, which has no finite open subcover. $\boxed{2}$

3. Let $X = [0, 1] \times [0, 1]$. Define an equivalence relation on X by $(x_1, y_1) \sim (x_2, y_2)$ if and only if either $(x_1 = 0, x_2 = 1$ and $y_1 = 1 - y_2)$ or $(x_1 = x_2$ and $y_1 = y_2)$. Identify the surface which is homeomorphic to the quotient space X^*. $\boxed{2}$

4. A topological space X is said to be locally compact if for each point $x \in X$, there exists a compact set C contains a neighborhood of x. Show that product of two locally compact spaces is locally compact. $\boxed{2}$

5. A topological space X is said to be Lindelöf space if every open cover of X has a countable open subcover. Show that continuous image of Lindelöf space is Lindelöf space. $\boxed{2}$

END