Class Test 9

18$^{\text{th}}$ November, 2025

Name: ____

Time: 40 min **Marks:** ____/10

Q1. A subset $A \subset X$ is called *meager* if A can be written as a countable union of nowhere dense sets of X; otherwise A is called *non-meager*. A space X is called *Baire* if countable intersection of open dense sets is dense. A (locally) compact T_2 space is a Baire space. Prove the following. $[4 + 1 + 2 + 3 = 10]$

a) X is non-meager if and only if countable intersection of open dense sets of X is non-empty.
b) A Baire space is non-meager (in itself).
c) A subset of meager set is again meager.
d) $X = [0, 1] \cup (\mathbb{Q} \cap [2, 3])$ (as a subspace of $\mathbb{R}$) is non-meager (in itself), but not Baire.