

1. Answer all the following questions: $2 \times 3 = 6$

a. If (X, d) be a metric space and $A, B \subset X$; then prove that $(A \cap B)^\circ = A^\circ \cap B^\circ$

b. If (X, d) be a metric space and $x \in X$. N_x be the collection of all nbds of x , then prove that $M, N \in N_x \Rightarrow M \cap N \in N_x$.

c. If $i^{i \dots i \text{ to } \infty} = A + iB$, then prove that $A^2 + B^2 = e^{-\pi B}$.

2. Answer all the questions: $4 \times 2 = 8$

a. If (X, d) be any metric space. Then show that the function d_1 defined by $d_1(x, y) = \frac{d(x, y)}{1 + d(x, y)}$ is a metric on X .

b. If (X, d) be a metric space. Then show that each open sphere in X is an open set.

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