

Point Set Topology

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Problem 1 Consider the set $X = \{a, b, c, d, e\}$ and the following collection of subsets of X

$$\mathcal{T} = \{\emptyset, \{a\}, \{c, d\}, \{a, b, c\}, \{b, c, d, e\}\}.$$

1. Prove that (X, \mathcal{T}) is a topological space.
2. Is X a connected space? Justify your answer.