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Question 1: (5x3=15 marks)

Prove or disprove the following:

1. If A is a subset of a topological space , then .
2. Let A and B be subsets of a topological space with , then
3. Let A and B be subsets of a topological space.
4. The co-finite topology is weaker than the usual topology on
5. No topology on has a proper subset which is both open and closed.

Question 2: (5+2+5=12 marks)

Let , and let be a collection of subsets of .

1. Prove that is a topology on .
2. Describe the closed subsets of .
3. If , then find , , and . Is dense in .

Question 3: (2+5+6=13 marks)

1. Define a base for a topological space, and give an example.
2. Let be a topological space and be nonempty subset of . Prove that if is a base for the topology , then the collection is a base for the subspace topology on
3. Let 𝐴 and 𝐵 be subsets of a topological space. Prove that

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Good Luck ☺