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| **College of Sciences** |  |
| **Department of Mathematics** |  |
| **373 Math** |  |
| **First Midterm** |  |
| **Second Semester 1433-1434** |  |

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**Question 1:** Let . Let be the collection of subsets of consisting of and all subsets of with the form , .

1. Prove that is a topology on .
2. List the closed subsets of .
3. Let , find , , and . **JUSTEFY YOUR ANSWER**

**Question 2:**

1. Give a definition of a base for a topological space.
2. Prove that is a base for a topology on . Describe the topology.

**Question 3:** Let be a topological space and let be a finite collection of closed subsets of . Prove that is closed subset of . Is the union of an infinite number of closed sets closed set. **JUSTEFY YOUR ANSWER**

**Question 4:** Let and be subsets of a topological space. Prove the following:

1. If , then is open and closed set.