Department of Mathematics

College of Sciences

King Saud University

Math 373

2nd midterm examination

First semester, 1430 H

|  |
| --- |
|  |

**Q1. (a)** Define the following:

1. Base for the topology .
2. Homeomorphism.
3. A Hausdorff space.

**(b)** Prove or disprove the following statements:

1. In a space any collection of open sets whose union equals X and that is closed under finite intersection is a base for .
2. Every constant function between any topological spaces is continuous.
3. Any two discrete topological spaces are homeomorphic.

**Q2.** Let 

1. Let  be such that show that the inclusion function  is open, where .
2. Is  Hausdorff? Justify your answer.

**Q3. (a)** Let  and be topological spaces and let be a function. Show that if for each closed subset of  is a closed subset of  then is continuous.

**(b)** Show that the subspaces of are homeomorphic.

**(c)** Show that distance is not a topological property.

**Q4.** Let  be topological spaces.

**(a)** Show that  where .

**(b)** If are Hausdorff, prove that is Hausdorff.

Good Luck