Topology

Homework #4. Due Monday, October 9, before the lecture.

Read §23, §24 and the first half of §27. See §3 for the definition the least upper bound property, needed in §24.

Do the following problems.

Exercises 1, 4, 9, 7 on page 152.

Exercises 1, 8, 9 on pages 157–158.

1. Which of the following subsets of $\mathbb{R}^2$ are connected? Provide brief justifications for your answers.

- $[0,1] \times (0,1)$
- $\mathbb{Q} \times \mathbb{Z}$
- Graph of the function $f(x) = \sin(3x)$.
- $\mathbb{Q} \times \mathbb{R}$
- $\{(x,y) | x^2 + y^2 > 1\}$
- $\{(x,y) | x^2 + y^2 = 1\}$
- $\{(x,y) | 4 \leq x^2 + y^2 < 9\}$
- Pairs of points (x,y) such that at least one of x, y is irrational.
- $\{(x,y) | x \neq 0\}$
- Graph of the function $f(x) = \tan(x)$.