Math 425/525 B Spring 2019 Homework 1
Due Wednesday, January 16th, 2019

**General Instruction:** Below are the problems assigned for Homework 1. The homework will be collected at the beginning of class on Wednesday, January 16th, 2019, within the first 10 minutes of the class period. Otherwise, it is considered late. The assignment should be neatly written and the multiple pages should be stapled together. Otherwise, it may not be graded. (No paper clips or creative folding techniques). To receive credit, you must show all work, and your work must be easy to read. If you just give only your final answer in your solution, you may get zero credit for that part. For an individual submission, only some of the problems will be selected to grade and the maximal point is 10 points. You do not submit practice problems, but you should prepare these for your exams.

**Special instruction for groups’ submissions:** Only one submission for each group is accepted and LaTeX is mandatory. Your TA will evaluate your group assignments and give feedbacks if necessary. Notice that each group is given an additional chance to revise before the final submission. The due date of the first submission is Wednesday, January 16th, 2019, and the deadline of the final submission is 5pm - Friday, January 18th 2019. Each group will submit their homework to the email of your TA. Note that the maximal point of a group submission is 20 points and each member in the group will receive the same score. First submission will be graded over 15 points and the final submission will be graded over the remaining 5 points.

I strongly encourage you to come to my office hours early and often for help on the homework. However, please be aware that I will expect you to have given a problem serious effort before asking about it.

- Dr. Kha’s office hours are: Monday 9:00 - 9:50 am, Wednesday 9:00 - 9:50 am in Math 305 and Tuesday 11 am - 12 pm in Math 220, and by appointment. You can contact Dr. Kha by email at minhkha@math.arizona.edu
- Our TA Thomas Doehrman has 425/525 B tutoring hour from 1pm to 2pm every Tuesday in ENR2 N270AA. The email of your TA is thomasdoehrman@math.arizona.edu
- And, you can get help from other faculty in the Math 220 Tutor Lab. Here is the schedule: http://math.arizona.edu/academics/tutoring/math310

**Reminders**

Some important dates:

- Exam 1 Monday, February 18th
- Exam 2 Wednesday, April 3rd
- Presentation: April 26th - May 1st
- Final Exam: Friday, May 3rd, 10:30am-12:30pm.
Homework Problems from Textbook Analysis II - Terence Tao, third edition

To be collected on Wednesday, January 16th, 2019

1. Exercise 1.1.3, p9
2. Exercise 1.1.5, p9
3. Exercise 1.1.6, p9
4. Exercise 1.1.11, p10
5. Exercise 1.1.12, p10
6. Exercise 1.1.16, p10

Practice problems - DO NOT SUBMIT

7. Exercise 1.1.2, p9
8. Exercise 1.1.4, p9
9. Exercise 1.1.7, p10
10. Exercise 1.1.8, p10
11. Exercise 1.1.9, p10
12. Exercise 1.1.10, p10
13. Exercise 1.1.13, p10
14. Exercise 1.1.14, p10
15. Exercise 1.1.15, p10

16. (Extensions of metric spaces) Let \( X \) be a set and \( Y \) be a subset of \( X \). Assume that there exists a distance function \( d_Y \) on \( Y \times Y \), i.e., \( (Y, d_Y) \) is a metric space. Show that there exists a distance function \( d_X \) on \( X \times X \) (i.e., \( (X, d_X) \) is a metric space) satisfying \( (Y, d_Y) \) is exactly the induced metric space from \( (X, d_X) \), i.e., the restriction of \( d_X \) on \( Y \times Y \) is exactly the metric \( d_Y \). This exercise means that you can always extend any metric function on a set to a larger set.