Math 425/525 B Spring 2019 Homework 2
Due Wednesday, January 23rd, 2019

General Instruction: Below are the problems assigned for Homework 2. The homework will be collected at the beginning of class on Wednesday, January 23rd, 2019, within the first 10 minutes of the class period. Otherwise, it is considered late. Unless you have the permission from the instructor, electronic submission will not be allowed in general. 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 23rd, 2019, and the deadline of the final submission is 5pm - Friday, January 25th 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](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 23rd, 2019

1. Exercise 1.2.3, parts (b)-(e)-(g)-(h) p15
2. Exercise 1.2.4, p15
3. Exercise 1.4.4, p20
4. Exercise 1.4.7, p20
5. (Pullback metric) Suppose that $(Y, d_Y)$ is a metric space and $X$ is a set. Suppose that $f : X \to Y$ is an injective mapping. Define the pullback metric $d_X$ on $X$ as follows:

   \[ d_X(x_1, x_2) := d_Y(f(x_1), f(x_2)), \quad \forall x_1, x_2 \in X \]

   (a) Check that $(X, d_X)$ is a metric space.
   (b) If $U$ is open in $(Y, d_Y)$, show that $f^{-1}(U)$ is also open in $(X, d_X)$.
   (c) If $V$ is open in $(X, d_X)$, is it true that $f(V)$ is also open in $(Y, d_Y)$? Give a counterexample if it is not true.

EXTRA PROBLEMS for GROUP SUBMISSION - Not for individual submission

6. Exercise 1.4.8, p21

Practice problems - DO NOT SUBMIT

7. Exercise 1.2.1, p15
8. Exercise 1.2.2, p15
9. Exercise 1.2.3 parts (a)-(c)-(d)-(f), p15
10. Exercise 1.3.1, p17
11. Exercise 1.4.1, p20
12. Exercise 1.4.2, p20
13. Exercise 1.4.3, p20
14. Exercise 1.4.5, p20
15. Exercise 1.4.6, p20