Math 432/532 Spring 2020 Homework 3
Due Monday, February 10, 2020

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. Aubrey's office hours are: Monday from 2-3pm in Math 220 and Tuesday and Wednesday from 2-3pm in Math 219, and by appointment. You can contact Dr. Aubrey by email at jaubrey@math.arizona.edu.

- And, undergraduate students can get help from other faculty in the Math 220 Tutor Lab. Here is the schedule: `http://math.arizona.edu/academics/tutoring/math310`

To be collected on Monday, February 10, 2020 for all students in Math 432/532

1. (Munkres, pg. 101 #8) Let A, B, and A_α denote subsets of a topological space X. Determine which of the following equations hold; if an equality fails, give and example, and determine whether one of the inclusions $\supset$ or $\subset$ holds.

   (a) $\overline{A \cap B} = \overline{A} \cap \overline{B}$.

   (b) $\overline{\bigcap A_\alpha} = \bigcap \overline{A_\alpha}$.

   (c) $\overline{A - B} = \overline{A} - \overline{B}$.

2. (Munkres, pg. 101 #10) Show that every order topology is Hausdorff.

3. (Munkres, pg. 101 #13) Show that X is Hausdorff if and only if the diagonal $\Delta = \{x \times x \mid x \in X\}$ is closed in $X \times X$.

4. (Munkres, pg. 101 #14) In the finite complement topology on $\mathbb{R}$, to what point or points does the sequence $x_n = 1/n$ converge?

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5. (Munkres, pg. 101 # 17) Consider the lower limit topology on $\mathbb{R}$ and the topology given by the basis $\mathcal{C}$ of Exercise 8 in Section 13. Determine the closures of the intervals $A = (0, \sqrt{2})$ and $B = (\sqrt{2}, 3)$ in these two topologies.

Reminders

- Exam 1 February 19th and 21st.

- Exam 2 April 8th and 10th.

- Final Exam: Thursday, May 14, 10:30am-12:30pm.