Math 424A
Assignment 9
due Friday, December 11

These problems pertain to sections 4.15–4.18. As for the rest of the chapter: Section 4.21 contains a pretty result that has a lot of applications in more advanced subjects. I’ll discuss it as time permits, but you won’t be responsible for it. The last two sections contain a few rather elementary facts about functions of a real variable. You should read them, but again I’m not going to emphasize them.


2. Problem 4.40. (Use Problem 4.39.)

3. Problem 4.43.

4. Problem 4.46. (Hint: To show connectedness, you can invoke Problem 4.39 to show that \( A \cup \{(0,0)\} \) is connected, then use a theorem from section 4.17.)

5. Problem 4.49.

6. Let \( S \) be a subset of \( \mathbb{R}^n \). Show that \( S \) is disconnected if and only if \( S = A \cup B \) where \( A \) and \( B \) are nonempty, \( \overline{A} \cap B = \emptyset \), and \( A \cap \overline{B} = \emptyset \). Here \( \overline{A} \) and \( \overline{B} \) are the closures of \( A \) and \( B \) in \( \mathbb{R}^n \), not just in \( S \). (Actually there’s nothing special about \( \mathbb{R}^n \) here. \( S \) could be a subset of any larger metric space.)

Reminder: The Final Exam is Wednesday, December, 16, 2:30–4:20pm. Office hours for the last week of classes and the period before the final are
or, as always, by appointment.