CSc 144 — Discrete Mathematics for Computer Science I
Spring 2023 (McCann)

http://u.arizona.edu/~mccann/classes/144

Homework #5

(50 points)

Due Date: March 17th, 2023, at the beginning of class

Directions

1. **This is an INDIVIDUAL assignment; do your own work! Submitting answers created by computers or by other people is NOT doing your own work.**
2. Start early! Getting help is much easier n days before the due date/time than it will be n hours before.
3. Write complete answers to each of the following questions, in accordance with the given directions. Create your solutions as a PDF document such that each answer is clearly separated from neighboring answers, to help the TAs easily read them. Show your work, when appropriate, for possible partial credit.
4. The questions that have section numbers are found in the Rosen text, available via D2L. Note that "(w,z)" is asking you to complete parts w and z only, not parts x and y.
5. If you have questions about any aspect of this assignment, help is available from the class staff via piazza.com and our office hours.
6. When your answers are ready to be turned in, do so on gradescope.com. Be sure to assign pages to problems after you upload your PDF. Need help? Visit https://help.gradescope.com/ and search for "Submitting an Assignment."
7. **Solutions submitted more than five minutes late will cost you a late day. Submissions more than 24 hours late are worth no points.**

Section 2.1: Sets:

1. (2 points) Section 2.1, 2(b)
2. (2 points) Section 2.1, 12(a,f)
3. (2 points) Section 2.1, 18. Show both in a single Venn diagram.
4. (2 points) Section 2.1, 20
5. (2 points) Section 2.1, 32. Specifically, what can you conclude about A and B?

Section 2.2: Set Operations:

6. (6 points) Section 2.2, 8(a). You may use either the "$X \subseteq Y$ and $Y \subseteq X$" approach, or the "convert to set builder notation, prove, and convert back to set notation" approach. (Better still, try both, for the additional practice!)
7. (4 points) Section 2.2, 16(b). Write a complete direct proof. Note that this question is asking for one–half of the "$X \subseteq Y$ and $Y \subseteq X$" set equality proof approach.
8. (2 points) Section 2.2, 54(b)

(Continued . . .)

Section 9.1: Relations and Their Properties:

9. (6 points) Section 9.1, 2(a,b,c)
10. (4 points) Let $D = \{1, 3, 5, 7, 11, 13\}$, and let R be a relation on D such that xRy when $2x < y$.
    (a) Give a representation of R using normal set notation.
    (b) Draw a directed graph (digraph) representation of R.
11. (4 points) Section 9.1, 4(b,d)
12. (4 points) Section 9.1, 6(b,d)
13. (4 points) Section 9.1, 14(b,d). Use relations b and d from Exercise 6 in Rosen. The definition of irreflexivity is given above exercise 11.
14. (2 points) Section 9.1, 16. See the "Remarks" after Definitions 3, 4, and 5 for examples.
15. (4 points) Section 9.1, 30(a,c)