

Instructions: This homework is an individual effort. Answer each question. This is due on **Friday, June 25th** by midnight to my office 4001A in the Coliseum. **Show all work to receive full credit.** Here is a link to the textbook needed to do the homework: **Discrete Mathematical Structures**

1 1.1

1. Do the following problems from the book: 1, 5, 11, 15, and 18

2 1.2

2. Do the following problems from the book: 3, 5, 10, 12, 17, 27, 29 (start by taking an element in $A \cup C$ and saying why it is in $B \cup D$. Similarly for the other subset.)

3 1.3

3. Do the following problems from the book: 7, 12, and 14

4 1.4

4. Do the following problems from the book: 6, 8, 9 (for these 3 use both unique prime factorization and Euclidean Algorithm to find the gcd.), 12, and 14 (this means to find the remainder of the input when divided by 7. Write it in congruence notation).

5 1.5

5. Do the following problems from the book: 4, 5, 8, 13, 18

6 1.6

6. Let GL_2 denote the set of 2 by 2 matrices with determinant nonzero and integer elements. Show that $(GL_2, *)$ is a mathematical structure that is closed, has an identity, is always associative, and contains all inverses. (Closedness is the hardest part! Write out a product of 2 matrices with arbitrary elements and work with the determinant to show it is not 0!)
7. Show which of the four conditions checked above fails if the determinant can be 0.