**CSE2023 - ASSIGNMENT #2**

Solve the following questions from course book. (Discrete Mathematics and Discrete Mathematics and Its Applications, 7th Ed. by Kenneth Rosen)

Note that we may grade selected questions from HWs.

1. Suppose that A is the set of sophomores at your school and B is the set of students in discrete mathematics at your school. Express each of these sets in terms of A and B.
    a) the set of sophomores taking discrete mathematics in your school
    b) the set of sophomores at your school who are not taking discrete mathematics
    c) the set of students at your school who either are sophomores or are taking discrete mathematics
    d) the set of students at your school who either are not sophomores or are not taking discrete mathematics

2. What can you say about the sets A and B if we know that
    a) $A \cup B = A$?
    b) $A \cap B = A$?
    c) $A - B = A$?
    d) $A \cap B = B \cap A$?
    e) $A - B = B - A$?

3. Can you conclude that A = B if A, B, and C are sets such that
    a) $A \cup C = B \cup C$?
    b) $A \cap C = B \cap C$?
    c) $A \cup C = B \cup C$ and $A \cap C = B \cap C$?

4. Determine whether the symmetric difference is associative; that is, if A, B, and C are sets, does it follow that $A \oplus (B \oplus C) = (A \oplus B) \oplus C$?

5. Suppose that A, B, and C are sets such that $A \oplus C = B \oplus C$. Must it be the case that $A = B$?

6. Determine whether each of these functions is a bijection from **R** to **R**.

    a) $f(x) = 2x + 1$
    b) $f(x) = x^2 + 1$
    c) $f(x) = x^3$
    d) $f(x) = (x^2 + 1)/(x^2 + 2)$

7. Show that the function $f(x) = e^x$ from the set of real numbers to the set of real numbers is not invertible, but if the codomain is restricted to the set of positive real numbers, the resulting function is invertible.

8. Find *f o g* and *g o f*, where $f(x) = x^2 + 1$ and $g(x) = x + 2$, are functions from **R** to **R**.

9. Determine whether each of these sets is finite, countably infinite, or uncountable. For those that are countably infinite, exhibit a one-to-one correspondence between the set of positive integers and that set.
    a) the integers greater than 10
    b) the odd negative integers
    c) the integers with absolute value less than 1,000,000
    d) the real numbers between 0 and 2
    e) the set $A \times Z^+$ where $A = \{2, 3\}$
    f) the integers that are multiples of 10

10. Give an example of two uncountable sets A and B such that $A - B$ is
    a) finite
    b) countably infinite
    c) uncountable

**Submission Instruction**

- Please zip and submit all your files using filename ***YourNumberHW2.zip*** (ex: 150629573HW2.zip) to Canvas system (under Assignments tab).
- Select meaningful file names for your zipped files (Ex: HW2Prob1_YourNumber.pdf or HW2_YourNumber.pdf)

**Notes**:

1. Write your name and student ID on each sheet.
2. No late submission will be accepted