PSO sessions 1 and 2, week of February 10, 2020

PSO 1

Problem 1. Determine which relationship(s), $\subseteq$, $=$, or $\supseteq$, is true for each of the following pairs of sets:

1. $A \cup B, \ A \cup (B - A)$

2. $A \cup (B \cap C), \ (A \cup B) \cap C$

3. $(A - C) - B, \ A - B$

Problem 2. Prove or disprove the following statements:

1. If $A \cup C = B \cup C$, then $A = B$.

2. If $A \cap C = B \cap C$, then $A = B$.

Task 1. Use any remaining time as office hours.

PSO 2

Problem 1. Consider these functions from the set of licensed drivers in the state of Indiana. Is a function one-to-one if it assigns to a licensed driver his or her (a) birthdate (b) mother's first name (c) driver's license number?

Problem 2. Suppose $f : \mathbb{R} \to \mathbb{Z}$ where $f(x) = \lceil 2x - 1 \rceil$. Is f one-to-one? Is f onto?

Problem 3. Describe each of the following sequences recursively. Include initial conditions and assume that the sequences begin with a_1.

1. $a_n = 5^n$

2. $a_n = 1 + 2 + 3 + \ldots n$

3. $a_n = n!$

4. $0.1, 0.11, 0.111, \ldots$

5. $1^2, 2^2, 3^2, 4^2 \ldots$

Problem 4. You take a job that pays $25,000 annually. (a) How much do you earn n years from now if you receive a three percent raise each year? (b) How much do you earn n years from now if you receive a five percent raise each year? (c) How much do you earn n years from now if each year you receive a raise of $1,000 plus two percent of your previous years salary.

Task 1. Use any remaining time as office hours.