Fall 2017 COT 3100 Recitation #2: Set Practice
9/18-9/22/2017

Warm-Up Problems

1) The perimeter of a semicircular region in centimeters is equal to its area in square centimeters. What is the measure of the radius of the semicircular region, in centimeters?

2) The length of a diagonal (connecting opposite corners) on a cube is 10 feet. What is the surface area of the cube?

3) A vertical line divides a triangle with vertices (0,0), (1, 1) and (9, 1) into two regions of equal area. What is the equation of the line?

4) If $\frac{x}{x-1} = \frac{y^2+2y-1}{y^2+2y-2}$, then what is x equal to, in terms of y?

5) How many integers with 4 different digits in between 1000 and 9999 are there such that the absolute value of the difference between the first and last digit is 2?

Set Problems

6) Let A = {2, 3, 5, 7} and B = {1, 2, 4}. List the following sets: $A \cup B$, $A \cap B$, $A - B$, $B - A$, $A \times B$, $\wp(A)$, and $\wp(B)$.

7) Using proof by contradiction, prove the following assertion about finite sets A and B:

$$\text{If } A \cup B = A \cap B, \text{ then } A = B.$$

Once you set up the contradiction, you should have to investigate two cases.

8) Determine, with proof, whether or not the statement for #7 is true in both directions, namely, can we say that "If ***and only if*** $A \cup B = A \cap B$, then $A = B$?

9) Prove or disprove the following assertion: Let A, B and C be non-empty finite sets taken from the universe of integers. If $A \subseteq B \cap C$, then $\overline{B} \subseteq \overline{A}$.

10) Let A, B and C be three sets. Prove or disprove: $A - C = (A - B) \cup (B - C)$.