Math 300 – Homework 7

Due Thursday 10/24 at the beginning of class

Total points: 200 (Writing portion: 110 pts (all the problems marked by $*$).)

PART A

Problems from the textbook:

- Section 4.2

problem	5(a,b,d,e)*	6*	8*	9*	*12(b,c)
points	40	10	20	20	20

PART B

1. [10 points] For a real number r, define M_r to be the interval $[r-3, r]$. Let $A = \{3, 4, 5\}$. Write the sets $\bigcup_{\alpha\in A} M_\alpha$ and $\bigcap_{\alpha\in A} M_\alpha$ in a simpler form (as either an interval or a finite set of points). Show all steps leading to your final answer.

2. [20 points] Given $I = \{1, 2, 3, \ldots, 2019\}$. For each $i \in I$ define $A_i = \{i-1, i, i+1\}$. Write the following in a simpler form (as either an interval or a finite set of points). Show all steps leading to your final answer.

   (a) $\bigcap_{i\in I} A_i$ **(b)** $\bigcap_{i=j}^{j+1} A_i$ **(b)** $\bigcap_{i=j}^{j+2} A_i$ **(d)** $\bigcup_{i=j}^{k} A_i$, where $1 \le j < k \le 2019$.

3. [30 points] Let $i \in \mathbb{Z}$ and $A_i = \{i-1, i+1\}$. Write the following sets in a simpler form (as either an interval or a finite set of points). Show all steps leading to your final answer.

   (a) $\bigcup_{i=1}^{5} A_{2i}$ **(b)** $\bigcup_{i=1}^{250} A_{2i}$ **(c)** $\bigcup_{i=1}^{5} (A_i \cap A_{i+1})$ **(d)** $\bigcup_{i=1}^{250} (A_i \cap A_{i+1})$ **(e)** $\bigcup_{i=1}^{5} (A_{2i-1} \cap A_{2i+1})$
   (f) $\bigcup_{i=1}^{250} (A_{2i-1} \cap A_{2i+1})$

4. [30 points] Repeat the previous problem for $A_i = (i-1, i+1)$.