MATH230 Week 3 Worksheet - Sets II

Sets can be tough for the inexperienced. Review of late week 1 + early week 2

1: Convert {1,4,7,10,...,121} to builder notation

2: Convert {x | 7-x = 11 and x is a natural number} to roster notation

3: How many subsets of {1, q, a, z} aren't proper? What's the largest size of a proper subset?

4: True or false for the following: {p, o, s, t} = {s, p, o, t}; $\emptyset \in \emptyset$; $\{\emptyset\} = \emptyset$; $\{b,c\} \subseteq \{a,\{d,\{c,b\}\}\}$

5: Simplify $((A^c \cap B^c)^c \cup C \cup B)^c \cup (B^c \cap B)$

6: Let U = {1, 2, 3, 4, 5, 6, 7}, A = {1, 2, 3}, B = {3, 4, 5, 6}. Find A^c, $A \cup B$, $A^c \cap B$, $B \cap A^c$

Some problems from the week 2, especially late week 2

7: There are 8 billion people on Earth. If 5 billion have watched Gangnam Style and 6 billion have watched Baby Shark, how many are guaranteed to have watched both?

8: If $|A| = |B| = 12$, $|A \cap B| = |A \cap C| = 5$, $|B \cap C| = 4$, $|A \cap B \cap C| = 2$, $|A \cup B \cup C| = 25$, find $|C|$.

9: Royce DuPont made 1000 sales last year selling rare fish, uncles, and bugattis. In 900 sales, the customer bought a rare fish. 650 people bought **only** a rare fish. Everyone who bought a bugatti bought all 3 products. Among those who bought both an uncle and a rare fish, 222 could not afford a bugatti. Read that again. How many customers didn't buy a bugatti?

If you have nothing better to do, try 10.

10: $A_1, \ldots, A_n \subseteq \{1, 2, \ldots, 420\}$ are n subsets with $|A_i|$ odd and $|A_i \cap A_j|$ even for any $i \neq j$. What's the largest value of n that's possible?