

# Math 2203 Assgn #1 Solutions

Each Question is 4 pts for total /36.

1.1 4)



5) a) 1    b) 2    c) 16

d)  $\emptyset, \{1\}, \{2\}, \{3\}, \{4\}, \{1,2\}, \{1,3\}, \{1,4\}$   
 $\{2,3\}, \{2,4\}, \{3,4\}, \{1,2,3\}, \{1,3,4\}, \{1,2,4\}$   
 $\{2,3,4\}, \{1,2,3,4\}$

e)  $2^5, 2^6, 2^n$

10) For example  $\{40\}, \{0\}, \{0\}, \{1\}, \{2\}$   
Note each  $S_i$  is a set

1.2 3)  $M_3 = \{3, 6, 9, \dots\}$   
 $M_5 = \{5, 10, 15, \dots\}$

a)  $M_3 \cap M_5 = \{15, 30, 45, \dots\}$

b)  $M_3 \setminus M_5 = \{3, 6, 9, 12, 18, 21, 24, 27, 33, \dots\}$

c)  $\mathbb{N} \setminus M_3 = \{1, 2, 4, 5, 7, 8, \dots\}$

$$d) M_3 \cup M_5 = \{3, 5, 6, 9, 10, 12, 15, \dots\}$$

$$5) a) F \quad d) F \quad h) F \quad j) T$$

for h)  $(-2, 2) \notin E$  but  $(-2, 2) \in E$

for j)  $\cap E = (-1, 1) \in B$

$$6) x \in R \mid S$$

$$\Leftrightarrow x \in R \ \& \ x \in S$$

$$\Leftrightarrow x \in R \ \& \ x \in S^c$$

$$\Leftrightarrow x \in R \cap S^c$$

$$7. (x, y) \in A \times (B \cap C)$$

$$\Leftrightarrow x \in A \ \& \ y \in B \cap C$$

$$\Leftrightarrow x \in A \ \& \ y \in B \ \& \ y \in C$$

$$\Leftrightarrow (x \in A \ \& \ y \in B) \ \& \ (x \in A \ \& \ y \in C)$$

$$\Leftrightarrow (x, y) \in A \times B \ \& \ (x, y) \in A \times C$$

$$\Leftrightarrow (x, y) \in A \times B \cap A \times C$$

8. There are various ways to do this  
here's one way.

$$\cancel{S \subseteq S \cup T} \Rightarrow$$

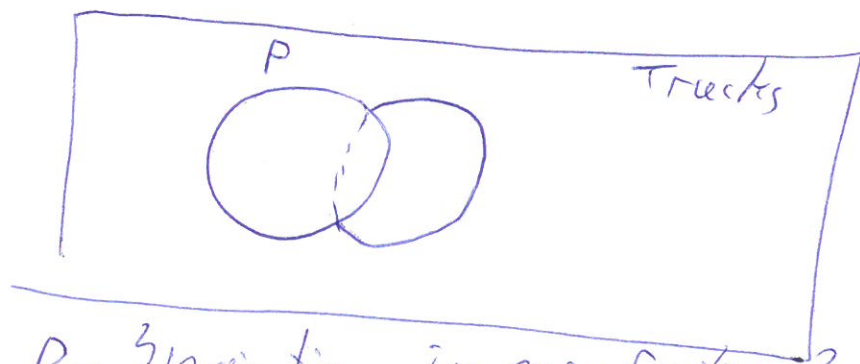
$$S \subseteq S \cup T \Rightarrow |S| \leq |S \cup T|$$

$$T \subseteq S \cup T \Rightarrow |T| \leq |S \cup T|$$

$$\text{So } |S| + |T| \leq 2|S \cup T|$$

$$\Rightarrow \frac{|S| + |T|}{2} \leq |S \cup T|$$

11.



$P = \{\text{painting imperfections}\}$

$W = \{\text{wood work errors}\}$

$$|P| = 31, \quad |W \setminus P| = 19$$

$$\text{So } |W| = |W \setminus P| + |W \cap P| > |P|$$

$$19 + |W \cap P| > 31$$

$$|W \cap P| > 12$$

So there are least 13 that have both  
types of problems.