

## Week 3 List of Theorems

### *De Morgan's Laws (DML)*

Let  $A$  and  $B$  be statements. Then

$$\neg(A \vee B) \equiv \neg A \wedge \neg B \quad \text{and} \quad \neg(A \wedge B) \equiv \neg A \vee \neg B$$

### *Bounds by Divisibility (BBD)*

Let  $a, b \in \mathbb{Z}$ . If  $a \mid b$  and  $b \neq 0$ , then  $|a| \leq |b|$ .

### *Transitivity of Divisibility (TD)*

Let  $a, b, c \in \mathbb{Z}$ . If  $a \mid b$  and  $b \mid c$ , then  $a \mid c$ .

### *Divisibility of Integer Combinations (DIC)*

Let  $a, b, c \in \mathbb{Z}$ . If  $a \mid b$  and  $a \mid c$ , then for all  $x, y \in \mathbb{Z}$ ,  $a \mid (bx + cy)$ .

### *Division Algorithm (DA)*

If  $a \in \mathbb{Z}$  and  $b \in \mathbb{N}$ , then there exist unique integers  $q$  and  $r$  such that  $a = qb + r$  where  $0 \leq r < b$ .