

Application of Number Theory

- **Def** | let $a, b \in \mathbb{Z}$ we say a **divides** b or b is **divisible** by a and we write $a | b$, if $\frac{b}{a} = n$ where $n \in \mathbb{Z}$

$$b = a \cdot n, \text{ for some } n \in \mathbb{Z}$$

- **Ex:** which statement is true?
 1. $2 | 5$: *False*, because $\forall n \in \mathbb{Z}, 5 \neq 2n$.
 2. $4 | 24$: *True*, because $24 = 4 \times 6, 6 \in \mathbb{Z}$
- **Remark:** $a | 0, \forall a \in \mathbb{Z}$ ##- Properties:
 1. If $a \nmid b$, then $\exists c, r \in \mathbb{Z}$ such that : $b = ac + r, r \neq 0$

r: remainder
 b: dividend
 a: divisor
 c: quotient