Day one lecture

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1 Proofs!

Definition: $\mathbb{N}$: 1,2,3...
$\mathbb{Z}$: ... -3,-2,-1,0,1,2,3...

Definition: If $a, d \in \mathbb{Z}$, then
$d|a$ ("d divides a") if $\exists k \in \mathbb{Z} \ni a = kd$

Definition: If $a, b, n \in \mathbb{Z}$ and $n > 0$, then
$a \equiv b$ mod n if $n|(a - b)$
"a is congruent to b modulo n"

Theorem: $\left.\begin{array}{l} n \in \mathbb{Z} \\ 6|n \end{array}\right\} \implies 3|n$

$a \equiv bmod(n) \iff \exists m|mn + b = a$

Well ordering axiom In any subset of N there exists a smallest element. : $\forall n \in \mathbb{N} \exists k \in \mathbb{N} \ni |7k - n| < 7$
Define $s = 7i|i \in \mathbb{N}7i > n$
By Well Ordering Axiom S contains a smallest element, call it $7k$(for some $k \in \mathbb{N}$).