1)

3/28(A) 제6강 Modulus of m and Homomorphism!

Def.

$$a_{\text{mod}}\ m \overset{\text{def}}{=} (a \div m)\text{의 } \cancel{\text{몫}}\ (\text{나머지})$$

※ 번역의 탄생 이희재

Def.

$$a \equiv_{\text{mod } m} b, \text{ iff } a_{\text{mod}}\ m = b \text{ mod } m$$

Ex) $6 \equiv_{\text{mod } 7} 20$

Def

$$[a]_{\text{mod } m} = \{ b \in \mathbb{Z} \mid a \equiv_{\text{mod } m} b \}$$

integers

$\equiv [a]_m$ for short

Ex) mod_7

$[0]_7 = \{\ldots, -7, 0, 7, 14, 21, \ldots\}$

$[1]_7 = \{\ \ , -6, 1, 8, 15, 22, \ldots\}$

$\vdots$

$[6]_7 = \{\ \ldots, -1, 6, 14, 21, \ldots\}$

$[7]_7 = \{\ldots, -7, 0, 7, 14, 21 \ldots\} = [0]_7$

$+ : \mathbb{Z} \times \mathbb{Z} \to \mathbb{Z}$

$+_m : \mathbb{Z} \times \mathbb{Z} \to \underline{\mathbb{Z}_m} = \{0, 1, 2, 3, 4, 5, 6\}$

$\boxed{257 +_7 381}$ $\quad 638 \div 7] = (91, 1)$

$\in [1] = \cancel{[8]}_7$

$\mathbb{N}_1 = \{1, 2, \dots\}$

$\mathbb{N}_0 = \{0, 1, \dots\}$

~~$|\mathbb{N}_1| = |\mathbb{N}_0|$~~ written $\mathbb{N}_1 \cong_f \mathbb{N}_2$

If $\mathbb{N}_1 \subsetneq \mathbb{N}_0$ but $|\mathbb{N}_1| = |\mathbb{N}_0|$ $\overset{\leftrightarrow}{f}$

In finite sets

If $S \subsetneq T$ then $|S| < |T|$

$S \subseteq T$ then $|S| \leq |T|$

A is isomorphic to B_0 with respect to (w.r.t) the bijection f

$A \cong_f B$.

$f(A) = B$

$f^{-1}(B) = A$

$(\mathbb{N}, +)$ … algebra

$(\mathbb{N}, +, 0)$ … monoid.

$(A, \oplus) \xrightarrow{h} (B, \otimes)$