International Journal of Scientific Advances
ISSN: 2708-7972
Volume: 5 | Issue: 3 | May – Jun 2024 Available Online: www.ijscia.com
DOI: 10.51542/ijscia.v5i3.30

Mathematical Lock in and Lock Out

Epimaco A. Cabanlit, Jr.*

Mindanao State University, General Santos City, Philippines

*Corresponding author details: Epimaco A. Cabanlit, Jr.; maco_727@yahoo.com

ABSTRACT
In this paper, we propose a definition for the terms lock in and lock out in the area of mathematics, particularly in Set Theory.

Keywords: set theory; universal set; subsets; difference of sets; lock in and lock out.

INTRODUCTION
In [1], lock in is defined as a place in a place where something cannot be removed or someone cannot escape. In [2], Lock in is defined as an act or instance of becoming unalterable, unmovable, or rigid, and commitment, binding, or restriction.

In Set Theory, we encountered the terms: sets, subsets, classes, subclasses, operations with sets and classes [3]. In abstract algebra, we encountered the terms: groups, subgroups, rings, subrings, vector spaces, subspaces [4]. So far, we have not encountered the terms lock in and loc out in mathematics.

In this paper, we propose a definition for lock in and lock out of sets.

PROPOSED DEFINITION
In this section, we propose two definitions for the lock in and lock out. The first definition is good for two subsets. The second definition is when we have n subsets.

Definition 1. Let U be a universal set, with subsets A and B. The lock in of A, denoted by $L(A)$, is defined as $L(A) = A - B = A \cap B^c$, where B^c is the complement of B. The lock out of A, denoted by $L^c(A)$, is defined as $L^c(A) = (A - B)^c = (A \cap B^c)^c = A^c \cup B = B \cup A^c$, where A^c is the complement of A and $A - B$ is the difference of two sets A and B.

This is illustrated in a Venn Diagram (Figure 1). The shaded portion is the lock in of A, while the unshaded portion is the lock out of A. The shading really matches with the concept of lock in and lock out. Thoe elements in the lock in of A are exclusively the elements of A.

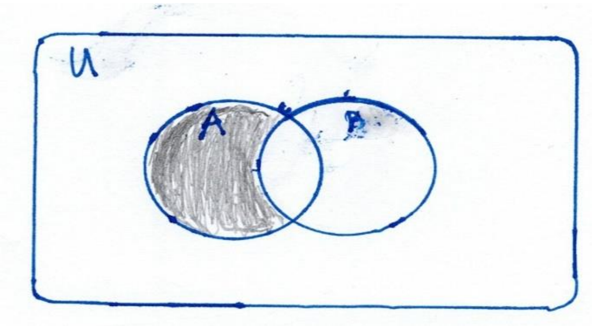

FIGURE 1: $L(A)$.

Definition 2. Let U be a universal set, with subsets $A_1, A_2, A_3, \ldots, A_i, \ldots A_n$. The lock in of A_j,, denoted by $L(A_j)$, is defined as $L(A_j) = A_j - (\cup_{i \neq j} A_i) = A_j \cap (\cup_{i \neq j} A_i)^c$. The lock out of A_j, denoted by $L^c(A_j)$ is defined as $L^c(A_j) = \left(A_j - (\cup_{i \neq j} A_i)\right)^c = \left(A_j \cap (\cup_{i \neq j} A_i)^c\right)^c = \left(A_j \cap (\cap_{i \neq j} A_i^c)\right)^c = A_j^c \cup (\cap_{i \neq j} A_i^c)^c = A_j^c \cup (\cup_{i \neq j} A_i)$.

This is illustrated in a Venn Diagram (Figure 2). The shaded part is the lock in of A_j, and the unshaded part is the lock out of A_j.

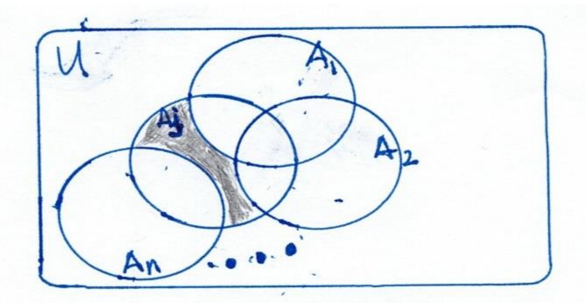

FIGURE 2: $L(A_j)$.

CONCLUDING REMARKS

At this time, we have already a shorten notation for the difference of two sets. Moreover, it is generalized when we have n subsets of *U.*

REFERENCES

[1] https://www.vocabulary.com/dictionary/lock%20in

[2] https://www.dictionary.com/browse/lock-in

[3] Pinter, C.C. A Book of Set Theory. Dover Publications, Inc. Mineola, New York, 1971.

[4] Fraleigh, G. B. A First Course in Abstract Algebra. Pearson Education Limited. England. 2014.