زانکۆی سەلاحەدین-هەولێر

Salahaddin University-Erbil

On Para semi_open sets

Research Project
Submitted to the department of (mathematic) in partial fulfilment of the
Requirements for the degree of BSc. In mathematic

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Supervised by:

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Certification of the Supervisors

I certify that this work was prepared under my supervision at the Department of Mathematics / College of Education / Salahaddin University-Erbil in partial fulfillment of the requirements for the degree of Bachelor of philosophy of Science in Mathematics.

Signature:
Supervisor: **Assist.Prof.Dr.Nehmat K. Ahmad**
Scientific grade: Assist. Professor
Date: 4 / 4 / 2024

In view of the available recommendations, I forward this work for debate by the examining committee.

Signature:
Name: **Dr. Rashad Rasheed Haje**
Scientific grade: Assist. Professor
Chairman of the Mathematics Department
Date: 4 / 4 / 2024

Acknowledgment

I would like to thanks Allah for giving me the power to complete this work And I would like to present my profound thanks to supervisor and lecturer **Assist. Prof. Dr. Nehmat K. Ahmed** for his kind valuable suggestions that assisted me to accomplish this work I would also like to extend my gratitude to the head of mathematic department **Assist. Prof. Dr. Rashad Rashid Haji,** and especially thanks for my family to support me and make me what am I today ,and thanks all my friends

Abstract

In this report we have a set which contain three and four elements X={a,b,c) And x={a,b,c,d}. The set which containing 3 element has 9 non comparable topology and the set which contains four element has 33 non comparable topology and we try to obtain some type of semi-*open sets* to each such topology.

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Introduction

General Topology or Point Set Topology. General topology normally considers local properties of spaces, and is closely related to analysis. It generalizes the concept of continuity to define topological spaces, in which limits of sequences can be considered. Sometimes distances can be defined in these spaces, in which case they are called metric spaces; sometimes no concept of distance makes sense.

In 1963, Levine introduced the concept of a semi-open set. The initiation of the study of generalized closed sets was done by Aull in 1968 as he considered sets whose closure belongs to every open superset. The notion of generalized semi-closed sets was introduced by Arya and Nour . In 1987, Bhattacharyya and Lahiri defined and studied the concept of semi- generalized closed sets via the notion of a semi-closed set.

Chapter one

Definition1.1: Topology(STEVEN A.GAAL,2009)

A topological space is ordered pair (X,π), where X is a non empty set, a collection π of subsets of X satisfying the following properties

1) $\emptyset$, X $\in \pi$,

2) U, V $\in \pi$ implies $U \cap V \in \pi$

3) $\{U_\alpha | \propto \in I\} \in \pi$ implies $U_{\propto \in I} U_\propto \in \pi$.

is called topology on X, the pair (X, π) is called a topological space, the elements of π are called open sets.

Definition1.2: Semi-open (A.A.Nasef volume 2,2009)

Let (X,π), be a topological spaces subset A of X is said to be Semi-open set if $A \subseteq clintA$

Definition1.3: interior (أ. م. د. يوسف يعكوب يوسف ٢٠١٨_٢٠١٩)

Let (X,π), be a topological spaces and A be a subset of X then Int A is the largest open set contained A

Definition1.4: closure(أ. م. د. يوسف يعكوب يوسف ٢٠١٨_٢٠١٩)

Let (X,π), be a topological spaces and A be a subset of X then ClA is the smallest closed set containing A

Definition1.5: Minimal semi open (Khalaf,A,B.,&Hasan,H.M.(2012)

A proper non–empty semi – open subset U at a topological space X is said to be minimal semi – open set if any semi– open set which is contained in U is ϕ or U, The family of all minimal semi- open sets in a topological space X is denoted by Minso(x).

Definition1.6: Maximal semi open(Khalaf, ,B.,&Hasan,H.M.(2012)

A proper non–empty semi– open set U of a topological space X is said to be maximal semi– open set if any semi open set which contains U is X or U. The family of all maximal semi- open sets in a topological space X is denoted by Maxso(x)

Definition1.7:Para S-open set(Basaraj M.Ittangi and S.S. Benchalli,2016)

Any open sunset U of at topolgical space X is said to be para s-open set if it is neither minimal s-open nor maximal s-open set the family of all para s-open sets in a topological space X is denoted paraso(X).

Chapter Two

The topologies which define on the set X= {a,b,c }which are different in element and property

$\pi_1=\{\emptyset, X\}$

$\pi_2=\{\emptyset, X, \{a\}\}$

$\pi_3=\{\emptyset, X, \{a, b\}\}$

$\pi_4=\{\emptyset, X, \{a\}, \{b, c\}\}$

,

$\pi_5=\{\emptyset, X, \{a\}, \{a, b\}\}$

$\pi_6=\{\emptyset, X, \{a\}, \{b\}, \{a, b\}\}$

$\pi_7=\{\emptyset, X, \{a\}, \{a, b\}, \{a, c\}\}$

$\pi_8=\{\emptyset, X, \{a\}, \{b\}, \{a, b\}, \{b, c\}\}$

$\pi_9=\{\emptyset, X, \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}, \{b, c\}\}$

let X={a, b, c}

$\pi_1=\{\emptyset, X\}$

$\pi^C = \{X, \emptyset\}$

$SO(X) = \{\emptyset, X\}$

$\text{MinSO}(x) = \{\emptyset\}$

$\text{MaxSO}X) = \{X\}$

$\pi_2 = \{\emptyset, X, \{a\}\}$
$\pi^C = \{X, \emptyset, \{b, c\}\}$

$SO(X) = \{X, \emptyset, \{a\}, \{a, b\}, \{a, c\}\}$

$\text{MinSO}(X) = \{\emptyset, \{a\}\}$

$\text{MaxSO}(X) = \{X, \{a, b\}, \{a, c\}$

$\pi_3=\{\emptyset, X, \{a, b\}\}$

$\pi^C = \{X, \emptyset, \{c\}\}$

$SO(X) = \{\emptyset, X, \{a, b\}\}$

$\text{MinSO}(X) = \{\emptyset, \{a, b\}\}$

$\text{MaxSO}(X) = \{X, \{a, b\}\}$

$\pi_4 = \{\emptyset, X, \{a\}, \{b, c\}\}$

$\pi^C = \{X, \emptyset, \{b, c\}, \{a\}\}$

$SO(X) = \{\emptyset, X, \{a\}, \{b, c\}\}$

$\text{MinSO}(X) = \{\emptyset, \{a\}, \{b, c\}\}$

$\text{MaxSO}(X) = \{X, \{a\}, \{b, \text{c}\}\}$

$\pi_5 = \{\emptyset, X, \{a\}, \{a, b\}\}$

$\pi^C = \{X, \emptyset, \{c\}, \{b, c\}\}$

$SO(X) = \{\text{X}, \emptyset, \{a\}, \{a, b\}, \{a, c\}\}$

$\text{MinSO}(X) = \{\emptyset, \{a\}\}$

$\text{MaxSO}(X) = \{X, \{a, \text{b}\}, \{a, \text{c}\}\}$

$\pi_6 = \{\emptyset, \text{X}, \{a\}, \{b\}, \{a, b\}\}$

$\pi^C = \{X, \emptyset, \{b, c\}, \{a, c\}\}, \{c\}\}$

$SO(X) = \{\emptyset, X, \{a\}, \{b\}, \{a, b\}, \{a, c\}, \{b, c\}\}$

$\text{MinSO}(X) = \{\emptyset, \{a\}, \{b\}\}$

$\text{MaxSO}(X) = \{X, \{a, b\}, \{a, c\}\}$

$\pi_7 = \{\emptyset, X, \{a\}, \{a, b\}, \{a, c\}\}$

$\pi^C = \{X, \emptyset, \{b\}, \{c\}, \{b, c\}\}$

$\text{SO}(X) = \{X, \emptyset, \{a\}, \{\text{b}\}, \{a, b\}, \{a, c\}\}$

$\text{MinSO}(X) = \{\emptyset, \{a\}, \{b\}\}$

$\text{ManSO}(X) = \{\emptyset, \{a, \text{b}\}, \{a, \text{c}\}\}$

π_8=$\{\emptyset, X, \{a\},\{b\}, \{a, b\}, \{b, c\}\}$

$\pi^C = \{X, \emptyset, \{b, c\}, \{a, c\}, \{c\},\{a\}\}$

SO(X)={ Ø,X,{ a},{b},{ b,c},{ a,b}}

MinSO$(X) = \{\emptyset,\{a\}, \{b\}\}$

MaxSO$(X) = \{$X,$\{a,$ b$\}, \{b, c\}\}$

π_9=$\{\emptyset, X,\{ a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}, \{b, c\}\}$

π^C =$\{\emptyset, X, \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}, \{b, c\}\}$

SO(X) =$\{\emptyset, X, \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}, \{b, c\}\}$

MinSO(X) =$\{\emptyset, \{a\}, \{b\}, \{c,\}\}$

Max$SO(X)$ =$\{X, \{a, b\}, \{a, c\}, \{b, c\}\}$

The topologies which define on the set X= {a,b,c,d}which are different in element and property

$\pi_1=\{\emptyset, X\}$

$\pi_2 = \{\emptyset, X, \{a\}\}$

$\pi_3=\{\emptyset, X, \{a, b\}\}$

$\pi_4=\{\emptyset, X, \{a, b, c\}\}$

$\pi_5 = \{\emptyset, X, \{a\}, \{b, c, d\}\}$

$\pi_6=\{\emptyset, X, \{a, b\}, \{c, d\}\}$

$\pi_7=\{\emptyset, X, \{a\}, \{a, b\}\}$

$\pi_8=\{\emptyset, X, \{a\}, \{a, b, c\}\}$

$\pi_9=\{\emptyset, X, \{a, b\}, \{a, b, c\}\}$

$\pi_{10}=\{\emptyset, X, \{a\}, \{a, b\}, \{a, b, c\}\}$

$\pi_{11}=\{\emptyset, X, \{a, b\}, \{a, b, c\}, \{a, b, d\}\}$

$\pi_{12}=\{\emptyset, X, \{a\}, \{b\}, \{a, b\}\}$

$\pi_{13}=\{\emptyset, X, \{a\}, \{b, c\}, \{a, b, c\}\}$

$\pi_{14}=\{\emptyset, X, \{a\}, \{a, b\}, \{a, c, d\}\}$

$\pi_{15}=\{\emptyset, X, \{a\}, \{a, b\}, \{a, c\}, \{a, b, c\}\}$

$\pi_{16}=\{\emptyset, X, \{a\}, \{a, b\}, \{a, b, c\}, \{a, b, d\}\}$

$\pi_{17}=\{\emptyset, X, \{a\}, \{b\}, \{a, b\}, \{a, b, c\}\}$

$\pi_{18}=\{\emptyset, X, \{a\}, \{b\}, \{a, b\}, \{a, c, d\}\}$

$\pi_{19}=\{\emptyset, X, \{c\}, \{a, b\}, \{a, b, c\}, \{a, b, d\}\}$

$\pi_{20}=\{\emptyset, X, \{a\}, \{a, b\}, \{c, d\}, \{a, c, d\}\}$

$\pi_{21}=\{\emptyset, X, \{a\}, \{a, b\}, \{a, c\}, \{a, b, c\}, \{a, b, d\}\}$

$\pi_{22}=\{\emptyset, X, \{a\}, \{b\}, \{a, b\}, \{b, c\}, \{a, b, c\}\}$

$\pi_{23}=\{\emptyset, X, \{a\}, \{b\}, \{a, b\}, \{a, b, c\}, \{a, b, d\}\}$

$\pi_{24}=\{\emptyset, X, \{a\}, \{b\}, \{a, b\}, \{c, d\}, \{a, c, d\}, \{b, c, d\}\}$

$\pi_{25}=\{\emptyset, X, \{a\}, \{b\}, \{a, b\}, \{b, d\}, \{a, b, c\}, \{a, b, d\}\}$

$\pi_{26}=\{\emptyset, X, \{a\}, \{b\}, \{a, b\}, \{a, c\}, \{a, b, c\}, \{a, c, d\}\}$

$\pi_{27}=\{\emptyset, X, \{a\}, \{a, b\}, \{a, c\}, \{a, d\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}\}$

$\pi_{28}=\{\emptyset, X, \{a\}, \{b\}, \{c\}, \{a, b\}, \{b, c\}, \{a, b, c\}\}$

$\pi_{29}=\{\emptyset, X, \{a\}, \{b\}, \{a, b\}, \{a, c\}, \{b, d\}, \{a, b, c\}, \{a, b, d\}\}$

$\pi_{30}=\{\emptyset, X, \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}, \{b, c\}, \{a, b, c\}, \{a, b, d\}\}$

$\pi_{31}=\{\emptyset, X, \{a\}, \{b\}, \{a, b\}, \{a, c\}, \{a, d\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}\}$

$\pi_{32}=\{\emptyset, X, \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}, \{a, d\}, \{b, c\}, \{a, b, c\},\{a, b, d\}, \{a, c, d\}\}$

$\pi_{33}=\{\emptyset, X, \{a\}, \{b\}, \{c\}, \{d\}, \{a, b\}, \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}, \{c, d\},\{a, b, c\}, \{a, b, d\},$
$\{a, c, d\}, \{b, c, d\}\}$

$\pi_1=\{\emptyset, X\}$

$SO(X) = \{\emptyset, X\}$

$MinSO(X) = \{\emptyset\}$

$MaxSO(X) = \{X\}$

$\pi_2 = \{\emptyset, X, \{a\}\}$

$SO(X) = \{X, \emptyset, \{a\}, \{a, b\}, \{a, c\}, \{a, d\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}\}$

$MinSO(X)=\{\emptyset, \{a\}\}$

$MaxSO(X) = \{X, \{a, c, d\}, \{a, b, d\}, \{a, c, d\}\}$

$Par(X)=\{\{a, b\}, \{a, c\}, \{a, d\}\}$

$\pi_3=\{\emptyset, X, \{a, b\}\}$

$SO(X) = \{\emptyset, X, \{a, b\}, \{a, b, c\}, \{a, b, d\}\}$

$MinSO(X) = \{\emptyset, \{a, b\}\}$

$MaxSO(X) = \{X, \{a, b, c\}, \{a, b, d\}\}$

π_4={Ø, X, {a, b, c}}

SO(X) = {Ø, X, {a, b, c}}

MinSO(X) = {Ø,{ a, b, c}}

MaxSO(X) = {X,{ a, b, c }}

π_5 = {Ø, X, {a}, {b, c, d}

SO(X) = {Ø, X, {a}, {b, c, d}}

MinSO(X) = {Ø, {a}, {b, c, d}}

MaxSO(X) = {X, {a}, {b, c, d}}

π_6={Ø, X, {a, b}, {c, d}}

SO(X) = {Ø, X, {a}, {b}, {a, b}, {a, c}, {b, c}}

MinSO(X) = {Ø, {a, b},{c, d}}

MaxSO(X) = {Ø, X, {a, b}, {c, d}}

π_7={Ø, X, {a}, {a, b}}

SO(X) = {Ø, X, {a}, {a, b}, {a, c}, {a, d}, {a, b, c}, {a, b, d}, {a, c, d}}

MinSO(X) ={Ø,{a}}

MaxSO(X) = {X, {a, b, c}, {a, b, d}, {a, c, d}, {b, c}, {d}, {c}, {b}}

Par(X) = {{ a, b},{a, c},{a, d}}

π_8={Ø, X, {a}, {a, b, c}}

SO(X) = {Ø, X, {a}, {a, b}, {a, c}, {a, d}, {a, b, c}, {a, b, d}, {a, c, d}}

MinSO(X) = {Ø, { a}}

MaxSO(X) = {X,{a, b, c},{a, b, d},{a, b, d}}

Par(X)={{a, b},{a, c},{a, d}}

π_9={Ø, X, {a, b}, {a, b, c}}

SO(X) = {Ø, X, {a, b}, {a, b, c}, {a, b, d}}

MinSO(X) = {Ø, { a, b}}

MaxSO(X)={X,{a, b, c},{a, b, d}}

π_{10}=$\{Ø, X$, {a}, {a, $b\}, \{a, b, c\}\}$

$\mathrm{SO}(X) = \{Ø, \mathrm{X}, \{a\}, \{a, b\}, \{a, c\}, \{a, d\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}\}$

MinSO(X) ={ Ø,$\{a\}$}

MaxSO(X) ={X,{a, b, c},{a, b, d},{a, c, d}}

Par(X)={{a, b},{a, c},{a, d}}

π_{11}=$\{Ø, X$, {a, $b\}, \{a, b, c\}$, {a, b, d}

$\mathrm{SO}(X) = \{Ø, X, \{a, b\}, \{a, b, c\}, \{a, b, d\}\}$

$\mathrm{MinSO}(X) = \{Ø$, {a,b}}

$\mathrm{MaxSO}(X) = \{ X$, {a, b, c}, {a, b, d}}

π_{12}=$\{Ø, X$, {a}, {b}, $\{a, b\}\}$

$SO(X) = \{P(x)/\{c, d\}, \{d\}, \{c\}\}$

$\mathrm{MinSO}(X) = \{Ø, \{a\}, \{b\}\}$

$\mathrm{MaxSO}(X)$ = {X, {a, b, c}, {a, b, d}, {a, c, d}, {b, c, d}}

$\mathrm{Par}(X) = \{\{a, b\}, \{a, c\}, \{a, d\}$, { b, c }, {b, d}}

π_{13}={Ø, X, {a}, {b, c}, {a, b, c}}

SO(X) = {Ø, {a}, {b, c}}

MinSO(X) = {Ø, X, {b, c, d}, {a, d}, {b, c}, {d}, {a}}

MaxSO(X) = {X, {a, d}, {a, b, c}, {b, c, d}}

π_{14}={Ø, X, {a}, {a, b}, {a, c, d}}

SO(X) = {Ø, X, {a}, {a, b}, {a, c}, {a, d}, {a, b, c}, {a, b, d}, {a, c, d}}

MinSO(X) = {Ø, {a}}

MaxSO(X) = {Ø, {a, b, c }, {a, b, d}, {a, c, d}}

Par(X) ={{a,b}, {a, c}, {a, d}}

π_{15}={Ø, X, {a}, {a, b}, {a, c}, {a, b, c}}

SO(X) = {Ø, X, {a}, {a, b}, {a, c}, {a, d}, {a, b, c}, {a, b, d }, {a, c, d}}

MinSO(X) = {Ø, {a}}

MaxSO(X) = { X, { a, b, c}, {a, b, d}, {a, c, d}}

π_{16}={Ø, X, {a}, {a, b}, {a, b, c}, {a, b, d}}

SO(X) = {Ø, X, {a}, {a, b}, {a, c}, {a, d}, {a, b, c}, {a, b, d}, {a, c, d}}

MinSO(X) = {Ø, {a}}

MaxSO(X) ={X, {a, b, c}, {a, b, d},{a, c, d}}

Par(x) ={{a, b},{a, b},{a ,c}}

π_{17}={ Ø , X, {a}, {b}, {a, b}, {a, b, c}}

$SO(X) = \{P(x)/\{c, d\}, \{d\}, \{c\}\}$

MinSO(X) = { Ø, {a}, { b}}

MaxSO(X) = {X, {a, b, c}, {a, b, d} , { a, c, d}, {b, c, d}}

π_{18}={Ø, X, {a}, {b}, {a, b}, {a, c, d}}

SO(X) = {Ø, X, {a}, {b}, {a, b}, {a, c}, {a, d}, {a, b, c}, {a, b, d}, {a, c, d}}

MinSO(X) = {Ø, { a},{ b}}

MaxSO(X) = { X, {a, b, c} ,{a, b, d} , {a, c, d}}

Par(X) = { {a, b}, {a , b} , {a, d}}

π_{19}=$\{\emptyset, X, \{\mathrm{c}\}, \{\mathrm{a}, b\}, \{a, b, c\}, \{\mathrm{a}, \mathrm{b}, \mathrm{d}\}\}$

$\mathrm{SO}(X) = \{\emptyset, X, \{c\}, \{a, b\}, \{a, b, c\}, \{a, b, d\}\}$

$\mathrm{MinSO}(X) = \{\emptyset, \{a, \mathrm{b}\}, \{c\}\}$

$\mathrm{MaxSO}(X) = \{X, \{a, \mathrm{b}, c\}, \{a, b, d\}\}$

π_{20}=$\{\emptyset, X, \{\mathrm{a}\}, \{\mathrm{a}, b\}, \{c, d\}, \{\mathrm{a}, \mathrm{c}, \mathrm{d}\}\}$

$\mathrm{SO}(X) = \{\emptyset, X, \{a\}, \{a, b\}, \{c, d\}, \{a, c, d\}\}$

$\mathrm{MinSO}(X) = \{\emptyset, \{a\}, \{c, d\}\}$

$\mathrm{MaxSO}(X) = \{X, \{a, b\}, \{a, c, d\}\}$

π_{21}=$\{\emptyset, X, \{\mathrm{a}\}, \{\mathrm{a}, b\}, \{a, c\}, \{\mathrm{a}, \mathrm{b}, \mathrm{c}\}, \{\mathrm{a}, \mathrm{b}, \mathrm{d}\}\}$

$\mathrm{SO}(X) = \{\emptyset, X, \{a\}, \{a, b\}, \{a, c\}, \{a, d\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}\}$

MinSO(X) =$\{\emptyset, \{a\}\}$

$\mathrm{MaxSO}(X) = \{X, \{a, \mathrm{b}, \mathrm{c}\}, \{a, \mathrm{b}, \mathrm{d}\}, \{a, \mathrm{c}, d\}\}$

π_{22}=$\{\emptyset, X, \{\mathrm{a}\}, \{b\}, \{\mathrm{a}, b\}, \{b, c\}, \{\mathrm{a}, \mathrm{b}, \mathrm{c}\}\}$

$\mathrm{SO}(X) = \{\emptyset, X, \{a\}, \{b\}, \{a, b\}, \{a, d\}, \{b, c\}, \{b, \mathrm{d}\}, \{a, b, c\}, \{a, b, d\}, \{b, c, d\}\}$

$\mathrm{MinSO}(X) = \{\emptyset, \{a\}, \{\mathrm{b}\}\}$

$\mathrm{MaxSO}(X) = \{X, \{a\}, \{a, \mathrm{b}, d\}, \{b, c, \mathrm{d}\}, \{a, b, \mathrm{d}\}\}$

$\mathrm{Par}(X) = \{\{b, d\}, \{b, c\}, \{a, d\}, \{a, \mathrm{b}\}\}$

π_{23}=$\{\emptyset, X, \{\mathrm{a}\}, \{\mathrm{b}\}, \{\mathrm{a}, b\}, \{\mathrm{a}, \mathrm{b}, \mathrm{c}\}, \{\mathrm{a}, \mathrm{b}, \mathrm{d}\}\}$

$SO(X) = \{P(x)/\{c, d\}, \{d\}, \{c\}\}$

$\mathrm{MinSO}(\mathrm{X}) = \{\emptyset, \{a\}, \{\mathrm{b}\}\}$

$\mathrm{MaxSO}(X) = \{\mathrm{X}, \{a, b, c\}, \{a, b, d\}, \{a, \mathrm{c}, \mathrm{d}\}, \{\mathrm{b}, \mathrm{c}, \mathrm{d}\}\}$

$\mathrm{Par}(X) = \{\{a, b\}, \{a, c\}, \{a, d\}, \{\mathrm{b}, \mathrm{c}\}, \{\mathrm{b}, \mathrm{d}\}\}$

π_{24}=$\{\emptyset, X, \{\mathrm{a}\}, \{\mathrm{b}\}, \{\mathrm{a}, b\}, \{\mathrm{c}, \mathrm{d}\}, \{\mathrm{a}, \mathrm{c}, \mathrm{d}\}, \{\mathrm{b}, \mathrm{c}, \mathrm{d}\}\}$

$\mathrm{SO}(X) = \{\emptyset, X, \{a\}, \{a, b\}, \{c, d\}, \{a, c, d\}, \{b, c, d\}\}$

$\mathrm{MinSO}(X) = \{\emptyset, \{a\}, \{\mathrm{b}\}, \{\mathrm{c}, \mathrm{d}\}\}$

$\mathrm{MaxSO}(X) = \{X, \{a, b\}, \{\mathrm{b}, c, d\}, \{a, c, d\}\}$

π_{25}={Ø, X, {a}, {b}, {a, b}, {b, d}, {a, b, c}, {a, b, d}}

SO(X) = {Ø, X, {a}, {b}, {a, b}, {a, c}, {b, c}, {b, d}, {a, b, c}, {a, b, d}, {b, c, d}}

MinSO(X) = {Ø, {a}, {b}}

MaxSO(X) = { X, {a, b, c}, {b, c, d}, {a, b, d}}

Par(X) = {{a, b}, {a, c}, {b, c},{ b, d}}

π_{26}={Ø, X, {a}, {b}, {a, b}, {a, c}, {a, b, c}, {a, c, d}}

SO(X) = {Ø, X, {a}, {b}, {a, b}, {a, c}, {a, d}, {a, b, c}, {a, b, d}, {a, c, d}}

MinSO(X) = {Ø, {a}, {b}}

MaxSO(X) = { X, {a, b, c}, {b, c, d}, {a, b, d}}

Par(X) = {{a, b}, {a, c}, {b, c},{b, d}}

π_{27}={Ø, X, {a}, {a, b}, {a, c}, {a, d}, {a, b, c}, {a, b, d}, {a, c, d}}

SO(X) = {Ø, X, {a}, {a, b}, {a, c}, {a, d}, {a, b, c}, {a, b, d}, {a, c, d}}

MinSO(X) = {Ø, {a}}

MaxSO(X) = {X, {a, b, c}, {b,c, d}, {a, c, d}}

Par(X) = {{a, b}, {a, c}, {a, d}}

π_{28}={Ø, X, {a}, {b}, {c}, {a, b}, {b, c}, {a, b, c}}

$SO(X) = \{P(x)/\{d\}\}$

MinSO(X) = { Ø ,{a},{ b},{ c}}

MaxSO(X) ={X, {a, b, c}, {a, b, d}, {a, c, d}, {b, c, d}}

Par(X) = {{a, b}, {a, c}, {b, c},{b, d}}

π_{29}={Ø, X, {a}, {b}, {a, b}, {a, c}, {b, d}, {a, b, c}, {a, b, d}}

SO(X) = {Ø, X, {a}, {b}, {a, b}, {a, c}, {b, d}, {a, b, c}, {a, b, d}}

MinSO(X) = {Ø, {a}, {b}}

MaxSO(X) = { X, {a, b, c}, {a, b, d}}

Par(X) = {{a, b}, {a, c},{b, d}}

π_{30}={Ø, X, {a}, {b}, {c}, {a, b}, {a, c}, {b, c}, {a, b, c}, {a, b, d}}

SO(X) = {P(x)/{d},{c, d}}

MinSO(X) = {Ø, {a}, {b}, {c}}

MaxSO(X) = { X, {a, b, c}, {b, c, d}, {a, b, d}, {a, c, d}}

Par(X) = {{a, b}, {a, c},{a, d} , {b, c},{b, d}}

π_{31}={Ø, X, {a}, {b}, {a, b}, {a, c}, {a, d}, {a, b, c}, {a, b, d}, {a, c, d}}

$SO(X) = \{Ø, X, \{a\}, \{b\}, \{a, b\}, \{a, c\}, \{a, d\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}\}$

$MinSO(X) = \{Ø, \{a\}, \{b\}\}$

MaxSO(X) = { X, {a, b, c}, {a, b, d}, {a, c, d}}

Par(X) = {{a, b}, {a, c},{a, d}}

π_{32}={Ø, X, {a}, {b}, {c}, {a, b}, {a, c}, {a, d}, {b, c}, {a, b, c},{a , b, d},{a , c, d}}

$SO(X) = \{Ø, X, \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}, \{a, d\}, \{b, c\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}\}$

MinSO(X)= ={Ø, X, {a}, {b}, {c}}

MaxSO(X) = { X, {a, b, c}, {a, b, d}, {a, c, d}}

Par(X) = {{a, b}, {a, c},{a, d},{b, c}}

π_{33}=P(X)

SO(X) =P(X)

MinSO(X) = {Ø, {a}, {b}, {c},{d}}

MaxSO(X) = { X, {a, b, c}, {a, b, d}, {a, c, d}, {b, c, d}}

Par(X)= {{a, b}, {a, c}, {a, d}, {b, c}, {b,d},{c,d}}

Chapter Three

Definition3.1:T_0_Space (STEVEN A.GAAL,2009)

A topological (X, π) is said to be para S_T_0_spase if for each pair at ditanct points x,y∈ X, There exist a Para S_open sets{G&H such that x∈G but y∉G or y∈H but x∉H}

Definition3.2:T_1-Space (STEVEN A.GAAL,2009)

A topological space (X, π) is said to be Para S_T1_space if for each pair of distinct points x,y∈P(X), There exist two Para S_open set G,H such that x∈G,y∉ G and x∉H,y∈ H.

Definition3.3:T_2-Space.(STEVEN A.GAAL,2009)

A topological space (X, π) is said to be S_T2_space if for each pair at distanct x,y ,there exist two distinct para S_open set G,H such that x∈G , y∈H and G$\cap H = \emptyset$.

X={a,b,c,d}	Para T_0 – Space	Para T_1-Space	Para T_2-Space
π_2	1	0	0
π_7	1	0	0
π_8	1	0	0
π_{10}	1	0	0
π_{12}	1	1	1
π_{14}	1	0	0
π_{15}	1	0	0
π_{18}	1	0	0
π_{22}	1	1	1
π_{23}	1	1	1
π_{25}	1	0	0
π_{26}	1	0	0
π_{26}	1	0	0
π_{27}	1	0	0
π_{28}	1	1	1
π_{29}	1	1	1
π_{30}	1	1	1
π_{31}	1	0	0

π_{32}	1	1	1
π_{33}	1	1	1

Note: In the set which contain 4 elements all 33 topology will be T_2-Space, T_1-Space, T_0-Space

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پوخته

لەم ڕاپۆرتەدا کۆمەڵێکمان هەیە کە سێ توخم و ٤ توخم لە خۆ دەگرێ ، کە توخمی ٣، ٩ تۆپۆلۆجی بەراوردکراوی هەیە وە توخمی٤ ، ٣٣ تۆپۆلۆجی هەیە، ئێمە هەوڵدەدەین کۆمەڵەی کراوەی

On para semi-open set

بەدەست بهێنین.

خلاصه

فی هذا التقرير ، لدينا مجموعة من 3 و 4 عناصر،يحتوي على 3،9 طوبولوجيا قابلة للمقارنة ، وهناك أربعة ، 33 عنصر طوبولوجيا،نحاول الحصول على مجتمع on para semi- sets مفتوح