زانکۆی سەلاحەدین - هەولێر
Salahaddin University-Erbil

Ps-open set in topological space

Research Project

Submitted to the department of (Mathematics) in partial fulfillment of the requirements for the degree of BSc. in mathematics

By:

Sumaia Abdullah Haji

Supervised by:

Nehmet Ahmed

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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
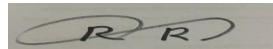
Signature:

Supervisor : **Dr.Nehmet Ahmed**

Scientific grade: Assist. Professor

Date: 5 /4 /2023

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: 5/4 /2023

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Abstract

In this report we have of set which contain three and four elements $X = \{a, b, c)$ and $X = \{a, b, c, d\}$

Which the 3 element has 9 comparable topology elements and four element has 33 comparable topology and we try to obtain the Ps open set in topological space

Table Contents

INTRODUCTIONS

Throughout this paper, a space X means a topological space with out any separation axioms. We recall the following

definitions, notions and characterizations. The closure (resp. interior) of a subset A of X is denoted by ClA (resp. IntA). A subset A of X is said to be preopen [4] (resp. semi-open [5], regular open [6] and regular semi-open [7]) if A⊂IntClA (resp. A⊂ClIntA, A⊂IntClIntA, A⊂ClIntClA, A=IntClA and A = sIntsClA). The complement of a preopen (resp. semi-open, regular open and regular semi-open) set is said to be preclosed (resp. semi-closed). The intersection of all preclosed (resp. semi- closed) set of X containing a subset A is called the preclosure (resp. semi- closure) of A and is denoted by pClA (resp. sClA). The union of all preopen (resp. semi-open) sets of X contained in A is called the preinterior (resp. semi-interior) of A and is denoted by pIntA (resp. sIntA). The family of all preopen (resp. semi-open, regular semi-open, preclosed, semi-closed and regular closed) subsets of a topological space X is denoted by PO(X) (resp. SO(X), RSO(X), PC(X), SC(X).

CHAPTER ONE

Definition1.1:[3] A subset A of a topological space X is said to be Semi–open iff A⊆cl int A.

Definition1.2: [A] A subset A of a topological space X is said to be Pre– open iff A⊆ int cl A.

Definition 1.3:[1] A subset A of pre – open set is said to be p_s – open set of X if for each x∈A there exist a semi- closed set F such that x∈F⊆A.

Definition1.4:[2] A subset A of X is said to be g $_{Ps}$ – closed set iff $_{Ps}$ cl A ⊆ u, when ever A⊆ u , u is p_s open set.

Example: Let X={a,b,c}

$\pi1=\{\emptyset,X\}$

$\pi2=\{\emptyset,X,\{a\}\}$

$\pi3=\{\emptyset,X,\{a,b\}\}$

$\pi4=\{\emptyset,X,\{a\},\{b,c\}\}$

$\pi5=\{\emptyset,X,\{a\},\{a,b\}\}$

$\pi6=\{\emptyset,X,\{a\},\{b\},\{a,b\}\}$

$\pi7=\{\emptyset,X,\{a\},\{a,b\},\{a,c\}\}$

$\pi8=\{\emptyset,X,\{a\},\{b\},\{a,b\},\{b,c\}\}$

$\pi9=\{\emptyset,X,\{a\},\{b\},\{c\},\{a,b\},\{a,c\},\{b,c\}$

$\pi 1=\{\emptyset, \mathbf{X}\}$

PO(x)=P(x)

SO(x)= {∅,X}

SC(x)= {∅,X}

PsC(x)={∅, X}

PsO(x)={ ∅,X}

Ps g-closed =P(x)

Ps g-open =P(x)

$\pi 2=\{\emptyset, X, \{a\}\}$

SO(x)= {∅,X,{a},{a,b},{a,c}}

SC(x)= {∅,X,{b,c},{c},{b}}

PO(x)= {∅,X,}

PsC(x)={∅,X,{a},{a,b},{a,c}}

PsO(x)={ ∅,X}

Ps g-open =P(x)

Ps g-closed =P(x)

$\pi 3=\{\emptyset, X, \{a,b\}\}$

SO(x)= {∅,X,{a,b}}

SO(x)= {∅,X,{c}}

PO(x)=P(x)

PsC(x)={∅,X}

PsO(x)={ ∅,X}

Ps g-closed =P(x)

Ps g-open =P(x)

π4={∅,X,{a},{a,b}}

SO(x)= {∅,X,{a},{a,b},{a,c}}

SC(x)= {∅,X,{b,c},{c},{b}}

PO(x)= {∅,X{a},{a,b},{a,c}}

PsC(x)={∅,X,{a},{b,c}}

PsO(x)={ ∅,X{a},{b,c}}

Ps g-closed =P(x)

Ps g-open =P(x)

π5={∅,X,{a},{b,c}}

SO(x)= {∅,X,{a},{b,c}}

SC(x)= {∅,X,{c,b}{a}}

PO(x)=P(x)

PsC(x)={∅,X}

PsO(x)={ ∅,X}

Ps g-closed =P(x)

Ps g-open =P(x)

π6={∅,X,{a},{b},{a,b}}

SO(x)= {∅,X{a},{b},{a,b},{a,c},{b,c}}

SC(x)= {∅,X,{a},{b},{b,c},{a,c}}

PO(x)= {∅,X,{a},{b},{a,b},{a,c},{b,c}}

PsC(x)={∅,X,{b, c}{a, c},{c}}

PsO(x)={ ∅,X,{a},{b},{a,b}}

Ps g-closed ={ ∅,X,{c},{a,c},{b,c}},, Ps g-open ={∅,X,{b},{a},{a,c}}

$\pi 7 = \{\emptyset, X, \{a\}, \{a,b\}, \{a,c\}\}$

SO(x)= {∅,X,{a},{a,b},{a,c}}

SC(x)= {∅,X,{b,c},{c}{b}}

PO(x)={∅,X,{a},{a,b},{a,c}}

PsC(x)={∅,X}

Ps g-closed =P(x)

Ps g-open =P(x)

$\pi 8 = \{\emptyset, X, \{a\}, \{b\}, \{a,b\}, \{b,c\}\}$

SO(x)= {∅,X,{a}{b},{a,b},{a,c}}

SC(x)= {∅,X,{b,c},{a,c},{a}{b}}

PO(x)={∅,X,{a},{a,b},{a,c}}

PsO(x)={ ∅,X,{b},{a,c}}

PsC(x)={∅,X,{a,c}{b}}

Ps g-closed =P(x)

Ps g-open =P(x)

$\pi 9 = \{\emptyset, X, \{a\}, \{b\}, \{c\}, \{a,b\}, \{a,c\}, \{b,c\}\}$

SO(x)=P(x)

SC(x)=P(x)

PO(x)=P(x)

PsO(x)=P(x)

PsC(x)=P(x)

Ps g-open =P(x)

Ps g-closed =P(x)

let X={a,b,c,d}

let X={a,b,c,d}

$\pi 1=\{\emptyset,X\}$ $\pi 2=\{\emptyset,X,\{a\}\}$

$\pi 3=\{\emptyset,X,\{a,b\}\}$

$\pi 4=\{\emptyset,X,\{a,b,c\}\}$

$\pi 5=\{\emptyset,X,\{a\},\{b,c,d\}$

$\pi 6=\{\emptyset,X,\{a,b\},\{c,d\}\}$

$\pi 7=\{\emptyset,X,\{a\},\{a,b\}\}$

$\pi 8=\{\emptyset,X,\{a\},\{a,b,c\}\}$

$\pi 9=\{\emptyset,X,\{a,b\},\{a,b,c\}\}$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$\pi 1=\{\emptyset, X\}$

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

SC(x)= $\{\emptyset, X\}$

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

 PsC(x)=$\{\emptyset, X\}$

 PsO(x)=$\{\emptyset, X\}$

Ps g-open =P(x)

Ps g-closed =P(x)

$\pi 2=\{\emptyset, X, \{a\}\}$

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

SC(x)= $\{\emptyset, X\{b,c\}, \{c\}, \{b\}\}$

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

PsO(x)=$\{\emptyset, X\}$

PsC(x)=$\{\emptyset, X\}$

Ps g-open =P(x) ,Ps g-closed =P(x)

π3={∅,X,{a,b}}

SO(x)= {∅,X{a,b}

SC(x)= {∅,X{c}}

PO(x)= {∅,X{a},{a,b},{a,c}{b,c}{b}}

PsO(x)={∅,X}

PsC(x)={∅,X}

Ps g-open =P(x)

Ps g-closed =P(x)

π4={∅,X,{a,b,c}}

SO(x)= {∅,X{a,b,c}}

SC(x)= {∅,X{d}}

PO(x)= {∅,X{a},{b},{c},{a,b},{a,c},{a,d,{b,c},{a,b,c},{a,b,d},{a,c,d},{b,c,d}

PsO(x)={∅,X}

PsC(x)={∅,X}

Ps g-open =P(x)

Ps g-closed =P(x)

π5={∅,X,{a},{b,c,d}

SO(x)= {∅,X,{a},{b,c,d}}

SC(x)= {∅,X,{a},{b,c,d}}

PO(x)=P(x)

PsO(x)={∅,X,{a},{b,c,d}}

PsC(x)={∅,X,{b,c,d},{a}}

Ps g-open =P(x)

Ps g-closed =P(x)

$\pi 6 = \{\emptyset, X, \{a,b\}, \{c,d\}\}$

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

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

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

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

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

Ps g-open =P(x)

Ps g-closed =P(x)

$\pi 7 = \{\emptyset, X, \{a\}, \{a,b\}, \{a,c\}\}$

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

SC(x) = $\{\emptyset, X, \{b,c\}, \{c\}, \{b\}\}$

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

PsO(x)= $\{\emptyset, X\}$

PsC(x)= $\{\emptyset, X\}$

Ps g-open =P(x)

Ps g-closed =P(x)

$\pi 8 = \{\emptyset, X, \{a\}, \{a,b,c\}\}$

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

SC(x)= $\{\emptyset, X, \{b,c,d\}, \{c,d\}, \{b,d\}, \{b,c\}, \{d\}, \{b\}, \{c\}\}$

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

PsO(x)= $\{\emptyset, X\}$

PsC(x)= $\{\emptyset, X\}$

Ps g-open =P(x)

Ps g-closed =P(x)

$\pi 9=\{\emptyset,X,\{a,b\},\{a,b,c\}\}$

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

SC(x) $=\{\emptyset,X,\{c,d\},\{d\},\{c\}\}$

PO(x) $=$P(x) $\setminus\{\{c\},\{d\},\{c,d\}\}$

PsO(x)$=\{\emptyset,X\}$

PsC(x)$=\{\emptyset,X\}$

Ps g-open $=$P(x)

Ps g-closed $=$P(x)

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

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

SC(x) $=\{\emptyset,X,\{b,c\},\{c\},\{b\}\}$

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

PsO(x)$=\{\emptyset,X\}$

PsC(x)$=\{\emptyset,X\}$

Ps g-closed $=$P(x

Ps g-open$=$P(x)

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

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

SC(x) $=\{\emptyset,X,\{c,d\},\{d\},\{c\}\}$

PO(x)$=$P(x) $\setminus\{\{c\},\{d\},\{c,d\}\}$

PsO(x)$=\{\emptyset,X\}$

PsC(x)$=\{\emptyset,X\}$

Ps g-open $=$P(x)

Ps g-closed $=$P(x)

$\pi12=\{\emptyset,X,\{a\},\{b\},\{a,b\}\}$

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

SC(x)= P(x) \ {{a,b,d},{a,b,c},{a,b}}

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

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

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

Ps g-open ={$\emptyset,X,\{c\},\{d\},\{c,d\},\{a,c,d\},\{b,c,d\}$}

Ps g-closed ={$\emptyset,X,\{a\},\{b\},\{a,b\},\{a,b,c\},\{a,b,d\}$}

$\pi13=\{\emptyset,X,\{a\},\{b,c\},\{a,b,c\}\}$

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

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

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

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

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

Ps g-open =P(x)

Ps g-open =P(x)

$\pi14=\{\emptyset,X,\{a\},\{a,b\},\{a,c,d\}\}$

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

SC(x)={$\emptyset,X,\{c\},\{b\},\{d\},\{b,d\},\{c,d\},\{b,c,d\},\{b,c\}$}

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

PsO(x)={$\emptyset,X$}

PsC(x)={$\emptyset,X$}

Ps g-open =P(x)

Ps g-closed =P(x)

π15={∅,X,{a},{a,*b*},{a,c},{*a,b,c*}}

SO(x) ={∅,X,{a},{*a,b*},{a,c},{a,d},{a,c,d},{a,b,c},{a,b,d}}

SC(x) ={∅,X,{c},{b},{d},{b,d},{c,d},{b,c,d},{b,c}}

PO(x) ={∅,X,{a},{*a,b*},{a,c},{a,d},{a,c,d},{a,b,c},{a,b,d}}

PsO(x)={∅,X}

PsC(x)={∅,X}

Ps g-open =P(x)

Ps g-closed =P(x)

π16={∅,X,{a},{a,*b*},{*a,b,c*},{a,b,d}}

SO(x)={∅,X,{a},{*a,b*},{a,c},{a,d},{a,c,d},{a,b,c},{a,b,d}}

SC(x) ={∅,X,{c},{b},{d},{b,d},{c,d},{b,c,d},{b,c}}

PO(x)={∅,X,{a},{*a,b*},{a,c},{a,d},{a,c,d},{a,b,c},{a,b,d}}

PsO(x)={∅,X}

PsC(x)={∅,X}

Ps g-open =P(x)

Ps g-closed =P(x)

π17={∅,X,{a},{b},{*a,b*},{a,b,c}}

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

SC(x)=P(x) \{{a,b,d},{a,b,c}{a,b}}

PO(x)= {∅,X,{a},{b},{a,b},{a,b,c},{a,b,d}}

PsO(x)={∅,X,{a},{b},{a,b},{a,b,c},{a,b,d}}

PsC(x)={∅,X,{b,c,d},{a,c,d},{c,d},{d},{c}}

Ps g-closed ={∅,X,{c},{d},{c,d},{a,c,d},{b,c,d}}

Ps g-open ={∅,X,{a},{b},{a,b},{a,b,c},{a,b,d}

π18={∅,*X*,{a},{b},{*a,b*},{a,c,d}}

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

SC(x)={∅,*X*,{c},{b},{d},{b,d},{c,d},{b,c,d},{b,c,d},{b,c}}

PO(x)={∅,X,{a},{b},{a,b},{a,c}a,d}{a,b,c},{a,b,d}{a,c,d}}

PsO(x)= {∅,X,{b}{a,c,d}}

PsC(x)= {∅,X,{b}{a,c,d}}

Ps g-closed=P(x)

Ps g-open=P(x)

π19={∅,*X*,{c},{*a,b*},{*a,b,c*},{a,b,d}}

SO(x)= {∅,X{c},{a,b},{a,b,c},{a,b,d}}

SC(x)= {∅,X{c},{d},{c,d},{a,b,d}}

PO(x)=P(x) \{{d},{c,d}}

PsO(x)= {∅,X{c},{a,b,d}}

PsC(x)= {∅,X{c},{a,b},{a,b,c},{a,b,d}}

Ps g-closed={∅,X{c},{d},{a,d},{b,d},{c,d},{a,b,d}}

Ps g-open={∅,X{c},{a,b},{a,c},{b,c},{a,b,c},{a,b,d}}

π20={∅,*X*,{a},{*a,b*},{*c,d*},{a,c,d}}

SO(x)= {∅,X{a},{a,b},{c,d},{a,c,d}}

SC(x)= {∅,X{b,c,d},{c,d},{a,b},{b}}

PO(x)={∅,*X*,{a},{c},{d},{a,b},{a,c},{c,d},{a,c,d},{a,b,d},{a,b,c},{b,c}}

PsO(x)={∅,*X*,{a,b},{c,d}}

PsC(x)={∅,*X*,{a,b},{c,d}}

Ps g-closed=P(x),,Ps g-open=P(x)

$\pi21=\{\emptyset,X,\{a\},\{a,b\},\{a,c\},\{a,b,c\},\{a,b,d\}\}$

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

SC(x)=$\{\emptyset,X,\{b,c,d\},\{c,d\},\{b,d\},\{b,c\},\{d\},\{c\},\{b\}\}$

PO(x)$^=\{\emptyset,X,\{a\}\{a,b\},\{a,c\},\{a,d\},\{a,b,c\},\{a,b,d\},\{a,b,d\}\}$

PsO(x) =$\{\emptyset,X\}$,,,PsC(x)=$\{\emptyset,X\}$

Ps g-closed=P(x),,,Ps g-open=P(x)

$\pi22=\{\emptyset,X,\{a\},\{b\},\{a,b\},\{b,c\},\{a,b,c\}\}$

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

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

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

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

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

Ps g-closed=$\{\emptyset,X,\{d\},\{a,d\},\{b,d\},\{c,d\}\{b,c,d\}\}$

Ps g-open=$\{\emptyset,X,\{a,b,c\},\{b,c\},\{a,c\},[a,b\},\{a\},\{b\},\{c\}\}$

$\pi23=\{\emptyset,X,\{a\},\{b\},\{a,b\},\{a,b,c\},\{a,b,d\}\}$

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

SC(x)=P(x) \{{a,b,c},{a,b,d},{a,b}}

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

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

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

Ps g-closed=$\{\emptyset,X,\{d\},\{c\},\{c,d\},\{b,c,d\},\{a,c,d\}\}$

Ps g-open=$\{\emptyset,X,\{a,b,c\},\{a,b,d\},\{a,b\},\{a\},\{b\}\}$

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

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

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

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

Ps g-closed=P(x),,,Ps g-open=P(x)

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

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

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

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

PsO(x) $=\{\emptyset,X,\{a\},\{b,d\}\}$

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

Ps g-closed=$\{\emptyset,X,\{d\},\{c\},\{a,c\},\{b,c\},\{c,d\},\{a,d\}$

Ps g-open=$\{\emptyset,X,\{a\,,b,c\},\{a,b,d\}|,\{b,d\},\{a,d\},\{a,b\},\{b,c\}\}$

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

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

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

PO(x) $\boxed{=\{\emptyset,X,\{a\},\{b\},\{a,b\},\{a,c\},\{a,d\}\,,\{a,b,c\},\{a,b,d\},\{a,c,d\}\}}$

PsO(x=$\{\emptyset,X,\{b\},\{a,c,d\}\}$

Ps g-closed=P(x),,,Ps g-open=P(x)

π27={∅,*X*,{a},{a,*b*},{a,c},{a,d},{a,b,c},{a,b,d},{a,c,d}}

SO(x) ={∅,*X*,{a},{a,b},{a,c},{a,d} ,{a,b,c},{a,b,d},{a,c,d}}

SC(x) ={∅,*X*,{b,c,d},{c,d},{b,d},{b,c},{d},{c},{b}}

PO(x) ={∅,*X*,{a},{a,b},{a,c},{a,d} ,{a,b,c},{a,b,d},{a,c,d}}

PsO(x) ={∅,*X*}

PsC(x) ={∅,*X*}

Ps g-closed=P(x),,,Ps g-open=P(x)

π28={∅,*X*,{a},{*b*},{*c*},{a,*b*},{b,c},{a,c},{a,b,c}}

SO(x)= P(x) \{{d}}

SC(x) =P(x) \ {{a,b,c}}

PO(x) ={∅,*X*,{a},{b},{c}{a,b},{a,c},{b,c} ,{a,b,c}}

PsO(x) ={∅,*X*,{a},{b},{c}{a,b},{a,c},{b,c} ,{a,b,c}}

PsC(x) ={∅,*X*,{b,c,d},{a,c,d},{a,b,d},{c,d},{b,d},{a,d},{d}}

Ps g-closed={∅,*X*,{d},{a,d},{c,d},{b,d},{a,b,d},{a,c,d},{b,c,d}}

Ps g-open={∅,*X*,{a,b,c},{b,c},{a,b},{a,c},{c},{b},{a}}

π29={∅,*X*,{a},{*b*},{a,b},{a,c},{b,d},{a,b,c},{a,b,d}}

SO(x) ={∅,*X*,{a},{b},{a,b},{a,c},{b,d} ,{a,b,c},{a,b,d}}

SC(x) ={∅,*X*,{b,c,d},{a,c,d},{c,d},{b,d},{a,c},{d},{c}}

PO(x)= {∅,*X*,{a},{b},{a,b},{a,c},{b,d} ,{a,b,c},{a,b,d}}

PsO(x) ={∅,*X*,{a,c},{b,d}}

PsC(x) ={∅,*X*,{b,d},{a,c}}

Ps g-closed=P(x)

Ps g-open=P(x)

π30={∅,X,{a},{b},{c},{a,b},{a,c},{b,c},{a,b,c},{a,b,d}}

PO(x) ={∅,X,{a},{b},{c}{a,b},{a,c},{b,c} ,{a,b,c},{a,b,d}}

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

SC(x)= P(x) \{{a,b,c},{a,b}}

PsO(x) ={∅,X,{a},{b},{c}{a,b},{a,c},{b,c} ,{a,b,c},{a,b,d}}

PsC(x) ={∅,X,{b,c,d},{a,b,d},{c,d},{b,d},{a,d},{d},{c}}

Ps g-closed={∅,X,{b,c,d},{a,c,d},{a,b,d},{c,d},{a,d},{b,d},{d},{c}}

Ps g-open={∅,X,{a},{b},{c}{a,b},{a,c},{b,c} ,{a,b,c},{a,b,d}}

π31={∅,X,{a},{b},{a,b},{a,c},{a,d},{a,b,c},{a,b,d},{a,c,d}}

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

SC(x) ={∅,X,{b,c,d},{a,c,d},{c,d},{b,d},{b,c},{d},{c},{b}}

PO(x) ={∅,X,{a},{b},{a,b},{a,c},{a,d} ,{a,b,c},{a,b,d},{a,c,d}}

PsO(x) ={∅,X,{b},{a,c,d}

PsC(x) ={∅,X,{a,c,d},{b}}

Ps g-closed=P(x)

Ps g-open=P(x)

π32={∅,X,{a},{b},{c},{a,b},{a,c},{a,d},{b,c},{a,b,c}{,a,b,d},{a,c,d}}

SO(x) ={∅,X,{a},{b},{c}{a,b},{a,c},{a,d}{b,c} ,{a,b,c},{a,b,d},{a,c,d}}=PO(x)

SC(x) ={∅,X,{b,c,d},{a,c,d},{a,b,d}{c,d},{b,d},{b,c},{a,d}{d},{c},{b}}

Ps g-closed=P(x)

Ps g-open=P(x)

π33={∅,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}}

SO(x)=SC(x)=PO(x)=PsO(x)=PsC(x)=P(x)

Ps g-closed=Ps g-open=P(x)

CHAPTER TWO

Definition 2.1:[8](To Space)

A topological space X is said to be a To space if For any two points x ,y in X, there is an open set U such that x in U and y not in U or y in U and x not in U.

Definition 2.2[8](T1 Space)

A topological space X is said to be a T1 space if For any two points x,y in X there exists two open sets U and V such that x in U and y not in U, and y in V and x not in V.

Definition 2.3:[8](T2 Space or Hausdorff Space)

A Hausdorff space is a topological space in which each pair of distinct points can be separated by a disjoint open set.In other words, a topological space x is said to be a T2 space or Hausdorff space if For any two points x,y in X there exists two open sets U and V such that x in U, y in V, and U intersection V=emptyset.

X={a,b,c}	g Ps-To - space	g Ps-T1 – space	g Ps-T2 - space
t 1	1	1	1
t 2	1	1	1
t 3	1	1	1
t 4	1	1	1
t 5	1	1	1
t 6	1	0	0
t 7	1	1	1
t 8	1	1	1
t 9	1	1	1

X={a,b,c,d}	g Ps To -space	g Ps T1 –space	T g Ps 2 -space	X={a,b,c,d}	g Ps To -space	g Ps T1 -space	g PsT 2 -space
t 1	1	1	1	t 10	1	1	1
t 2	1	1	1	t 11	1	1	1
t 3	1	1	1	t 12	1	0	0
t 4	1	1	1	t 13	1	1	1
t 5	1	1	1	t 14	1	1	1
t 6	1	1	1	t 15	1	1	1
t 7	1	1	1	t 16	1	1	1
t 8	1	1	1	t 17	1	1	1
t 9	1	1	1	t 18	1	1	1

X={a,b,c,d}	g Ps To -space	g Ps T1 –space	g Ps T2 -space	X={a,b,c,d}	g Ps To -space	g Ps T1 -space	g Ps T2 –space
t 19	1	0	0	t 26	1	1	1
t 20	1	1	1	t 27	1	1	1
t 21	1	1	1	t 28	1	0	0
t 22	1	0	0	t 29	1	1	1
t 23	1	0	0	t 30	1	0	0
t 24	1	1	1	t 31	1	1	1
t 25	1	0	0	t 32	1	1	1
				t 33	1	1	1

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پوختە:

لەم راپۆرتەدا کۆمەڵێکمان هەیە کە ۳ توخم و ٤ توخم لەخۆ دەگریت کە توخمی ۳, ۹تۆپۆلۆجی بەراوردکراوی هەیە وە توخمی ٤, ۳۳ تۆپۆلۆجی هەیە, ئێمە هەوڵ دەدەین کۆمەڵەی کراوەی

Ps-open set

بە دەست بهێنین.

خلاصة

في هذا التقرير لدينا مجموعة تحتوي على ثلاثة وأربعة عناصر X = {a ،b ،c} و (x = {a ،b ،c ،d}

حيث يحتوي العنصر 3 على 9 عناصر طوبولوجيا قابلة للمقارنة وأربعة عناصر بها 33 طوبولوجيا قابلة للمقارنة ونحاول الحصول على Ps –open set in topological space