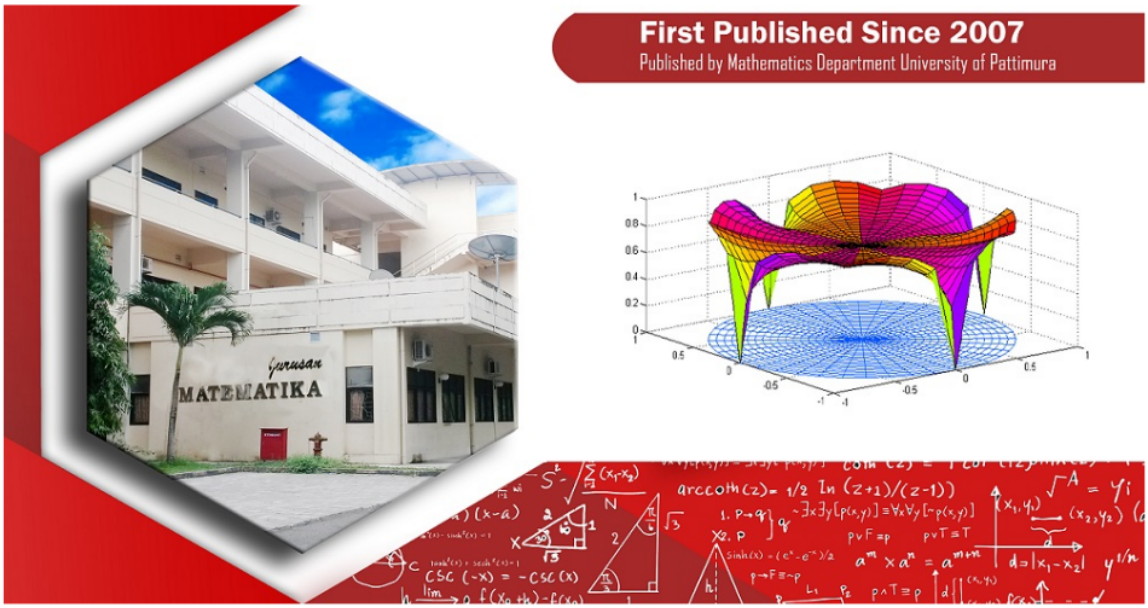
Lamp. B34

by I Gede Adhitya Wisnu Wardhana

Submission date: 27-Oct-2022 01:52AM (UTC-0500)
Submission ID: 1936685491
File name: Lampiran_B34.pdf (5.19M)
Word count: 4792
Character count: 24343



Journal Identity

Original journal title	BAREKENG : Jurnal Ilmu Matematika dan Terapan
English journal title	BAREKENG : Journal of Mathematics and Its Application
Country	Indonesia
Subject	Mathematics, Applied Mathematics
Language	English
ISSN	2615-3017 (online), 1978-7227 (print)
Frequency	4 issues per year (March, June, September, December)
DOI	Prefix 10.30598/ Crossref
Acreditation	SINTA 2, Decree Number: 158/E/KPT/2021, 9th December 2021
Editor-in-Chief	Yopi Andry Lesnussa [Sinta][Scopus][Google Scholar]
Publisher	Pattimura University
Citation Analysis	Google Scholar | Dimensions

OAI https://ojs3.unpatti.ac.id/index.php/barekeng/oai

BAREKENG: Jurnal ilmu matematika dan terapan, has been indexing by:

Call For Papers !!!

Call for Paper !!!

2022-09-28

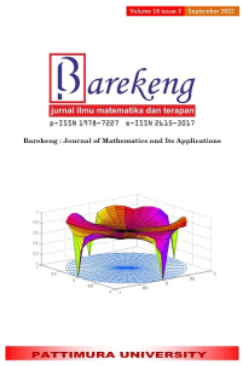
BAREKENG: Journal of Mathematics and Its Applications, call for papers to Volume 17 Issue 1 March 2022. Deadline submission on 30th November 2022.

Start from Volume 16 issue 1 March 2022 all manuscript must be in English. For non-native speaker, we request the authors to conduct it by using a professional English Language Editing. Alternatively, we offer the authors to conduct the English editing through services provide by the BAREKENG: Journal of Mathematics and Its Applications.

READ MORE >

Current Issue

Vol 16 No 3 (2022): BAREKENG: Jurnal Ilmu Matematika dan Terapan



BAREKENG : Journal of Mathematics and Its Applications, volume 16 issue 3 (September 2022) was officially published in English (also journal name officialy in english). BAREKENG : Journal of Mathematics and Its Applications, has been published four (4) times a year in March, June, September, and December (4 issues). This issue contain 40 articles available online and consists of authors from 3 countries (Indonesia, Malaysia and Nigeria).

PUBLISHED: 2022-09-01

Articles

2

ANALYSIS OF THE VACCINATION'S IMPACT ON THE INCREASE IN COVID-19'S DAILY NEW AND RECOVERED CASES USING THE VECTOR AUTOREGRESSIVE (VAR) MODEL (CASE STUDY: WEST KALIMANTAN)

Yundari Yundari, Nur'ainul Miftahul Huda

761-770

pdf download

Abstract views 42 | PDF Download downloads 44 |

CLASSIFICATION OF STUNTING IN CHILDREN UNDER FIVE YEARS IN PADANG CITY USING SUPPORT VECTOR MACHINE

Izzati Rahmi, Mega Susanti, Hazmira Yozza, Frilianda Wulandari

771-778

pdf download

Abstract views 49 | PDF Download downloads 44 |

RIDGE LEAST ABSOLUTE DEVIATION PERFORMANCE IN ADDRESSING MULTICOLLINEARITY AND DIFFERENT LEVELS OF OUTLIER SIMULTANEOUSLY

Netti Herawati, Subian Saidi, Dorrah Azis

779-786

pdf download

Abstract views 28 | PDF Download downloads 32 |

CALCULATION OF CREDITED INTEREST RATE WITH INVESTMENT YEAR METHOD AND PORTFOLIO METHOD

Jevilia Aryento, Felivia Kusnadi, Dharma Lesmono

787-796

pdf download

Abstract views 45 | PDF Download downloads 34 |

OUTLIER DETECTION ON HIGH DIMENSIONAL DATA USING MINIMUM VECTOR VARIANCE (MVV)

Andi Harismahyanti A., Indahwati Indahwati, Anwar Fitrianto, Erfiani Erfiani

797-804

pdf download

Abstract views 43 | PDF Download downloads 34 |

ONE-DIMENSIONAL CUTTING STOCK PROBLEM THAT MINIMIZES THE NUMBER OF DIFFERENT PATTERNS

Bib Paruhum Silalahi, Farida Hanum, Fajar Setyawan, Prapto Tri Supriyo

805-814

pdf download

Abstract views 54 | PDF Download downloads 33 |

THE BAYESIAN SEM APPROACH ON RELIGIOUS TOURISM AND SME'S ENTREPRENEURIAL OPPORTUNITY INTERRELATION IN RURAL AREA

Frilianda Wulandari, Dodi Devianto, Ferra Yanuar

815-828

pdf download

Abstract views 36 | PDF Download downloads 21 |

AN EXISTENCE AND UNIQUENESS OF THE WEAK SOLUTION OF THE DIRICHLET PROBLEM WITH THE DATA IN MORREY SPACES

Nicky Kurnia Tumalun

829-834

pdf download

Abstract views 38 | Pdf Download downloads 43 |

OPTIMAL CONTROL OF INFLUENZA A DYNAMICS IN THE EMERGENCE OF A TWO STRAIN

Jonner Nainggolan

835-844

pdf download

Abstract views 40 | Pdf Download downloads 32 |

TAGUCHI METHOD APPLIED FOR THE INVESTIGATION OF CORROSION LEVEL ON METAL INERT GAS WELDING OF MILD STEEL

Nanang Fatchurrohman, Low Tze Chin, Jufriadif Na'am

845-852

pdf download

Abstract views 34 | PDF Download downloads 35 |

AN ORDINAL LOGISTIC REGRESSION MODEL FOR ANALYZING RISK ZONE STATUS OF COVID-19 SPREAD

Tessya Mutiara Dewi, Rosita Kusumawati

853-860

pdf download

Abstract views 34 | Pdf Download downloads 25 |

MULTILEVEL NON-LINIER REGRESSION FOR REPEATED MEASURMENT DATA AS STUDY OF PEANUT GROWTH

Arie Purwanto, Umul Aiman

861-868

pdf download

Abstract views 47 | Pdf Download downloads 29 |

ON THE IRREGULARITY STRENGTH AND MODULAR IRREGULARITY STRENGTH OF FRIENDSHIP GRAPHS AND ITS DISJOINT UNION

Fredrylo Alberth Noel Joddy Apituley, Mozart W. Talakua, Yopi Andry Lesnussa

869-876

pdf download

Abstract views 22 | Pdf Download downloads 17 |

FUZZY LOGIC APPLICATION ON EMPLOYEE ACHIEVEMENT ASSESSMENT (CASE STUDY: EDUCATION QUALITY ASSURANCE INSTITUTE OF MALUKU PROVINCE)

Nurhidayah Nurhidayah, Yopi Andry Lesnussa, Zeth Arthur Leleury

877-886

pdf download

Abstract views 29 | Pdf Download downloads 22 |

QUOTIENT SEMINEAR-RINGS OF THE ENDOMORPHISM OF SEMINEAR-RINGS

Meryta Febrilian Fatimah, Fitriana Hasnani, Nikken Prima Puspita

887-896

pdf download

Abstract views 43 | Pdf Download downloads 24 |

SURVIVAL ANALYSIS OF DENGUE HEMORRHAGIC FEVER PATIENTS (DHF)

Firza Khairunnisa, Fazrina Saumi, Amelia Amelia

897-908

pdf download

Abstract views 48 | Pdf Download downloads 26 |

ON COMPUTATIONAL BAYESIAN ORDINAL LOGISTIC REGRESSION LINK FUNCTION IN CASES OF CERVICAL CANCER IN TUBAN

Nur Mahmudah, Fetrika Anggraini

909-918

pdf download

Abstract views 30 | Pdf Download downloads 24 |

2

COMPARISON OF ARIMA AND GARMA'S PERFORMANCE ON DATA ON POSITIVE COVID-19 CASES IN INDONESIA

A'yunin Sofro, Khusnia Nurul Khikmah
919-926

pdf download

Abstract views 47 | Pdf Download downloads 38 |

PERFORMANCE COMPARISON OF GRADIENT-BASED CONVOLUTIONAL NEURAL NETWORK OPTIMIZERS FOR FACIAL EXPRESSION RECOGNITION
Sri Nurdiati, Mohamad Khoirun Najib, Fahren Bukhari, Refi Revina, Fitra Nuvus Salsabila
927-938

pdf download

Abstract views 43 | Pdf Download downloads 68 |

TEXT CLUSTERING ONLINE LEARNING OPINION DURING COVID-19 PANDEMIC IN INDONESIA USING TWEETS
Maulida Fajrining Tyas, Anang Kurnia, Agus Mohamad Soleh
939-948

pdf download

Abstract views 37 | Pdf Download downloads 27 |

MULTI-RESPONSE OPTIMIZATION OF DIELECTRIC FLUID MIXTURE IN EDM USING GREY RELATIONAL ANALYSIS (GRA) IN TAGUCHI METHOD
Veniola Forestryani, Niam Rosyadi, Muhammad Ahsan
949-960

pdf download

Abstract views 37 | Pdf Download downloads 25 |

THE HARMONIC INDEX AND THE GUTMAN INDEX OF COPRIME GRAPH OF INTEGER GROUP MODULO WITH ORDER OF PRIME POWER
Muhammad Naoval Husni, Hanna Syafitri, Ayes Malona Siboro, Abdul Gazir Syarifudin, Qurratul Aini, I Gede Adhitya Wisnu Wardhana
961-966

pdf download

Abstract views 79 | Pdf Download downloads 34 |

ANALYSIS OF THE SPRUCE BUDWORM MODEL USING THE HEUN METHOD AND THIRD-ORDER RUNGE-KUTTA
Irwan Irwan, Muh Irwan, Rosmaniar Rosmaniar, Wahidah Alwi, Risnawati Ibnas
967-974

pdf download

Abstract views 25 | Pdf Download downloads 24 |

AN ITERATIVE PROCEDURE FOR OUTLIER DETECTION IN GSTAR(1;1) MODEL

Nur'ainul Miftahul Huda, Utriweni Mukhaiyar, Nurfitri Imro'ah

975-984

pdf download

BINARY LOGISTICS REGRESSION MODEL TO IDENTIFY FACTORS ASSOCIATED WITH LOW BIRTH WEIGHT (LBW) (CASE STUDY: BABY DATA AT DR. M. HAULUSSY HOSPITAL AMBON)

Yunita Puspita Sari, Marlon S. Noya Van Delsen, Yopi Andry Lesnussa

985-994

pdf download

CONTROL CHART AS VERIFICATION TOOLS IN TIME SERIES MODEL

Nurfitri Imro'ah, Nur'ainul Miftahul Huda

995-1002

pdf download

SPATIO-TEMPORAL ANALYSIS OF RUPIAH LOANS PROVIDED BY COMMERCIAL BANKS AND RURAL BANKS

Muktar Redy Susila

1003-1012

pdf download

THE INTERSECTION GRAPH REPRESENTATION OF A DIHEDRAL GROUP WITH PRIME ORDER AND ITS NUMERICAL INVARIANTS

Dewi Santri Ramdani, I Gede Adhitya Wisnu Wardhana, Zatta Yumni Awanis

1013-1020

pdf download

ANALYSIS OF COVID-19 FOMITE TRANSMISSION MODEL WITH DISINFECTANT SPRAY

La Ode Sabran, Ilham Dangu Rianjaya, Lilis Harianti Hasibuan, La Ode Nashar

1021-1030

pdf download

THE ROLE OF COST OF LOAN IN BANKING LOAN DYNAMICS: BIFURCATION AND CHAOS ANALYSIS

Moch. Fandi Ansori, Siti Khabibah

1031-1038

pdf download

SELECTING OPTIMAL PROCESS PARAMETERS OF Al2O3/C COMPOSITE USING GRA WITH PCA AND TAGUCHI'S QLF APPROACH

Idrus Syahzaqi, Hani Brilianti Rochmanto, Muhammad Ahsan

1039-1050

pdf download

DESIGN OF ROV STRAIGHT MOTION CONTROL USING PROPORTIONAL SLIDING MODE CONTROL METHOD

Firman Yudianto, Teguh Herlambang, Fajar Annas Susanto, Andy Suryowinoto, Berny Pebo Tomasouw

1051-1058

pdf download

2

MULTIPLE STRATEGIES AS OPTIMAL CONTROL OF A COVID-19 DISEASE WITH QUARANTINE AND USING HEALTH MASKS

Lukman Hakim

1059-1068

pdf download

THE PROPERTIES OF ROUGH V-COEXACT SEQUENCE IN ROUGH GROUP

Desfan Hafifullah, Fitriani Fitriani, Ahmad Faisol

1069-1078

pdf download

ESTIMATION OF THIRD FINGER MOTION USING ENSEMBLE KALMAN FILTER

Teguh Herlambang, Hendro Nurhadi, Abdul Muhith, Dinita Rahmalia, Berny Pebo Tomasouw

1079-1086

pdf download

APPLICATION FUZZY MAMDANI TO DETERMINE THE RIPENESS LEVEL OF CRYSTAL GUAVA FRUIT

Ahmad Kamsyakawuni, Abduh Riski, Anisa Binti Khumairoh

1087-1096

pdf download

Abstract views 30 | Pdf Download downloads 20 |

CENTRALITY MEASURES ON BRINKMANN GRAPH: BEFORE AND AFTER NODE DELETION

Masrurotullaily Masrurotullaily

1097-1104

pdf download

Abstract views 30 | Pdf Download downloads 26 |

FINANCIAL DISTRESS PREDICTION OF FINANCIAL SECTOR SERVICE COMPANIES ON INDONESIAN STOCK EXCHANGE USING COX PROPORTIONAL HAZARD

Candra Yanuar Dwi Putra, Mohamat Fatekurohman, Dian Anggraeni

1105-1114

5006

Abstract views 40 | 5006 downloads 24 |

ANALYTICAL HIERARCHY PROCESS IN DETERMINING LEVEL THE FEASIBILITY OF THE AUTOMATED TELLER MACHINE LOCATION (CASE STUDY BANK SYARIAH INDONESIA JEMBER)

Agustina Pradjaningsih, Dyan Mei Anggraeni, Kiswara Agung Santoso

1115-1122

pdf download

Abstract views 33 | Pdf Download downloads 31 |

NUMERICAL SOLUTION OF VOLTERRA INTEGRO-DIFFERENTIAL EQUATIONS BY AKBARI-GANJI'S METHOD

O. A. Uwaheren, A. F. Adebisi, C. Y. Ishola, M. T. Raji, A. O. Yekeem, O. J. Peter

1123-1130

pdf download

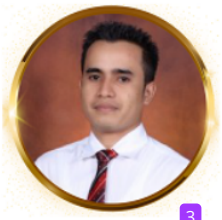
Abstract views 71 | PDF Download downloads 32 |

VIEW ALL ISSUES >

Accredited By:

Ministry of Education Culture, Research, and Technology, Republic of Indonesia, based on

EDITOR IN CHIEF



ASSOCIATE EDITOR

EDITORIAL BOARD

Prof. Dr. Basuki Widodo, M.Sc.
ITS Surabaya, Indonesia
[Scopus ID] [Google Scholar ID] [SINTA ID]

Prof. Dr. Budi Nurani Ruchjana, M.Si.
Universitas Padjajaran, Indonesia
[Scopus ID] [Google Scholar ID] [SINTA ID]

Prof. Drs. Marjono, M.Phil., Ph.D.
Universitas Brawijaya, Indonesia
[Scopus ID] [Google Scholar ID] [SINTA ID]

Prof. Dr. Atje Setiawan Abdullah, MS., M.Kom.
Universitas Padjadjaran, Indonesia
[Scopus ID] [Google Scholar ID] [SINTA ID]

Prof. Dr. Guisheng Zhai
Shibaura Institute of Technology, Japan
[Scopus ID] [Google Scholar ID]

Prof. Dr. Tanwey Gerson Ratumanan, M.Pd
Univeritas Pattimura, Indonesia
[Scopus ID] [Google Scholar ID] [SINTA ID]

Subchan, M.Sc., Ph.D.
ITS Surabaya, Indonesia
[Scopus ID] [Google Scholar ID] [SINTA ID]

Dr. Fajar Adi Kusumo, M.Si.
Universitas Gadjah Mada, Indonesia
[Scopus ID] [Google Scholar ID] [SINTA ID]

Dr. Bib Paruhum Silalahi, M.Kom.
Institut Pertanian Bogor, Indonesia
[Scopus ID] [Google Scholar ID] [SINTA ID]

Dr. Sobri Abusini, MT.
Universitas Brawijaya, Indonesia
[Scopus ID] [Google Scholar ID] [SINTA ID]

Dr. Sumardi, M.Si.
Universitas Gadjah Mada, Indonesia
[Scopus ID] [Google Scholar ID] [SINTA ID]

Dr. Ikha Magdalena, M.Si.
Institut Teknologi Bandung, Indonesia
[Scopus ID] [Google Scholar ID] [SINTA ID]

Dr. Rr. Kurnia Novita Sari, M.Si.
Institut Teknologi Bandung, Indonesia
[Scopus ID] [Google Scholar ID] [SINTA ID]

Dr. Yuwadee Klomwises
King Mo[illegible]ut's Institute of Technology, Thailand
[Scopus ID] [Google Scholar ID]

Prof. Dr. Theresia Lourens, M.Pd.
Universitas Pattimura, Indonesia
[Scopus ID] [Google Scholar ID] [SINTA ID]

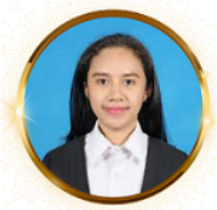
Hengameh R. Dehkodi, Ph.D.
Universidade Federal do ABC, Brazil
[Scopus ID] [Google Scholar ID]

Dr. Antonio Comi
Universita degli Studi di Roma "Tor Vergata", Roma
[Scopus ID] [Google Scholar ID]

Dr. Ahmad Fadillah bin Embong
Universiti Teknologi Malaysia
[Scopus ID] [Google Scholar ID]

Prof. Dr. Shakir Ali
Aligarh Muslim University, India
[Scopus ID] [Google Scholar ID]

ASSISTANT EDITORS



Norisca Lewaherilla, M.Si.
Universitas Pattimura, Indonesia
[Scopus ID] [Google Scholar ID] [SINTA ID]

Jefri Esna Thomas Radjabaycolle, M.Cs.
Universitas Pattimura, Indonesia
[Scopus ID] [Google Scholar ID] [SINTA ID]

Venn Yan Ishak Ilwaru, M.Si
Universitas Pattimura, Indonesia
[Scopus ID] [Google Scholar ID] [SINTA ID]

Submissions

THE HARMONIC INDEX AND THE GUTMAN INDEX OF COPRIME GRAPH OF INTEGER GROUP MODULO WITH ORDER OF PRIME POWER

Muhammad Naoval Husni, Hann...

Submission Review Copyediting

Production

Submission Files

Search

29652-1 aditmath, Barekeng 2022 The Harmonic Index and The Gutman Index of Coprime Graph of Integer Group Modulo n.docx	Article Text
31726-1 editor2, 6197-Article Text-31096-1-18-20220808 blind reviewer.docx	Article Text

Download All Files

Pre-Review Discussions

Add discussion

Name	From	Last Reply	Replies	Closed
Info Notifikasi Awal	editor2 Jun/29	aditmath Jul/01	2	
Info Perbaikan Pertama	editor2 Jul/01	-	0	
Hasil Perbaikan Pertama	aditmath Aug/08	-	0	

Plagiarism Check Result	jmbarekeng Aug/29

BAREKENG: Journal of Mathematics and Its Application
September 2022 Volume 16 Issue 3 Page 961–966
P-ISSN: 1978-7227 E-ISSN: 2615-3017
https://doi.org/10.30598/barekengvol16iss3pp961-966

THE HARMONIC INDEX AND THE GUTMAN INDEX OF COPRIME GRAPH OF INTEGER GROUP MODULO WITH ORDER OF PRIME POWER

Muhammad Naoval Husni[1], Hanna Syafitri[2], Ayes Malona Siboro[3], Abdul Gazir Syarifudin[4], Qurratul Aini[5], I Gede Adhitya Wisnu Wardhana [6*]

[1,2,3,5,6] *Department of Mathematics, Faculty of Mathematics and Natural Sciences, Mataram University, Nusa Tenggara Barat, 83125, Indonesia*
[4]*Department of Magister Mathematics, Faculty of Mathematics and Natural Sciences, Institut of Technology Bandung, Jawa Barat, 40132, Indonesia.*

Corresponding author's e-mail: [6*] *adhitya.wardhana@unram.ac.id*

Abstract. *In the field of mathematics, there are many branches of study, especially in graph theory, mathematically a graph is a pair of sets, which consists of a non-empty set whose members are called vertices and a set of distinct unordered pairs called edges. One example of a graph from a group is a coprime graph, where a coprime graph is defined as a graph whose vertices are members of a group and two vertices with different x and y are neighbors if only if (|x|,|y|)=1. In this study, the author discusses the Harmonic Index and Gutman Index of Coprime Graph of Integer Group Modulo n. The method used in this research is a literature review and analysis based on patterns formed from several case studies for the value of n. The results obtained from this study are the coprime graph of the group of integers modulo n has the harmonic index of* $2(\frac{n-1}{n})$ *and the Gutman index* $(n-1)(2n-3)$ *for* $n = p^k$ *where* p *is prime and* k *is a natural number.*

Keywords: *Harmonic Index, Gutman Index, Coprime Graph, Integer Group Modulo.*

Article info:
Submitted: 25th June 2022 *Accepted: 24th August 2022*

How to cite this article:
M. N. Husni, H. Syafitri, A. M. Siboro, A. G. Syarifudin, Q. Aini and I G. A. W. Wardhana, "THE HARMONIC INDEX AND THE GUTMAN INDEX OF COPRIME GRAPH OF INTEGER GROUP MODULO WITH ORDER OF PRIME POWER", *BAREKENG: J. Math. & App.*, vol. 16, iss. 3, pp. 961-966, September, 2022.

1. INTRODUCTION

Graph theory is used to represent discrete objects and the relationship between these objects. The visual representation of a graph is to represent objects as dots, circles, or points, while the relationship between objects is represented by lines. In recent years, a graph is used to visualize the algebraic structure such as groups or rings. Some of the graphs visualizing groups are the coprime graph of dihedral groups [1] and quaternion groups [2] on the dihedral group [3]. This coprime graph is introduced by Ma [4], and later the dual of the coprime graph, called non-coprime, that introduced by Mansoori [5], which also studied integer modulo [6] and dihedral group [7]. Some other graphs visualize are the power graph of groups [8][9], and the intersection graph of groups [10].

The coprime graph of groups given by Ma et. al is defined as a graph whose vertices are members of a group, and two different vertices x and y are adjacent if only if $(|x|,|y|) = 1$ [4]. Later, Juliana et. al gives some properties of the coprime graph of integer modulo group [11]. One of many important things in a graph is the topological index a graph, Hua et. al stated that atom-bond connectivity relies on the topological index of a graph [12]. In this article, we studied two topological indexes of the coprime graph for integer modulo, which are the Harmonic index and the Gutman index.

2. RESEARCH METHODS

This study conducts a literature review to achieve new knowledge from a recent terminology in the graph representation of the algebraic structure. First, we divide the problem into several cases and choose some examples to get a pattern and construct a conjecture from it. And by deductive proof, we prove the conjecture.

3. RESULTS AND DISCUSSION

This research will be discussed on the Harmonic Index and Gutman Index of Coprim Graph of Integer Group Modulo n, for n is a prime power.

3.1. Basic Terminology

These are some definitions and theorems to use in this research. The order of an element of groups is defined as follows

Definition 1 [11]
If G is a group with identity e and $x \in G$, the order of x is the power of natural number such that $x^k = e$ and write $|x| = k$.

The group representation in this study is the coprime graph, this graph is defined as follows.

Definition 2 [1]
The coprime graph of G group, denoted by Γ_G is a graph whose vertices are elements of G and two distinct vertices u and v are adjacent if and only if $(|x|,|y|) = 1$.

The degree of the graph is defined as follows.

Definition 3 [13]
The degree of a graph is the number of edges that are incident to the vertex. It is annotated as $deg(a)$ for a any vertice.

And the distance of the graph will be defined below.

Definition 4 [13]
The distance of a graph is the number of edges in a shortened path connecting them.

The first index that we study is the harmonic index, but first, we will define the Randic indexes of a graph.

Definition 5 [14]

Let G be a connected graph with $V(G)$ as a set of vertices and $E(G)$ as a set of edges. Randic index definition as,

$$R(G) = \sum_{uv \epsilon E(G)} (\deg(u) \deg(v))^{-\frac{1}{2}}$$

And the harmonic index will be defined as follows.

Definition 6 [15]

The harmonic index of the graph is denoted by $H(G)$ defined as follows.

$$H(G) = \sum_{uv \epsilon E(G)} \frac{2}{\deg(u) + \deg(v)}$$

With $deg(u)$ is the degree of vertices u that is the number of vertices $u \neq v$ with adjacent node u.

The second index is the Gutman index, which we defined as follows.

Definition 7 [14]

The Gutman Index of a graph G or denoted by $Gut(G)$ is defined as

$$Gut(G) = \sum_{\{u,v\} \epsilon V(G)} deg(u) deg(v) d(u,v)$$

With $\deg(u)$, $\deg(v)$ is the degree of u and v, and $d(u,v)$ is the distance of vertices u and v in graph G.

And last, we will give you a theorem that is very important through this article.

Theorem 1 [11]

If $n = p^k$ is for some prime p and $k \epsilon \mathbb{N}$, then the coprime graph of $\mathbb{Z}_n$ is a complete bipartite graph.

Proof. See [11]

3.2. The Harmonic Index of the Coprim Graph of Integer Modulo Group

In this research, the discussion will be focused on the harmonic index of the coprime graph of integer group modulo n with $n = p^k$ is for some prime p and $k \epsilon \mathbb{N}$.

Example 1

Let $\Gamma_{\mathbb{Z}_n}$ is coprim graph of $\Gamma_{\mathbb{Z}_5}$. Based on Theorem 1, $\Gamma_{\mathbb{Z}_5}$ is a complete bipartite graph. As a result, the degree of a node identity is 4 and another degree of a node is 1. So that is a harmonic index of $\Gamma_{\mathbb{Z}_5}$ is as follows.

$$H(\Gamma_{\mathbb{Z}_5}) = \sum_{uv \epsilon E(G)} \frac{2}{\deg(u) + \deg(v)}$$

$$H(\Gamma_{\mathbb{Z}_5}) = \frac{2}{\deg(0) + \deg(1)} + \frac{2}{\deg(0) + \deg(2)} + \frac{2}{\deg(0) + \deg(4)} + \frac{2}{\deg(0) + \deg(4)}$$

$$H(\Gamma_{\mathbb{Z}_5}) = \frac{2}{4+1} + \frac{2}{4+1} + \frac{2}{4+1} + \frac{2}{4+1} = \frac{8}{5}$$

With the same steps, we obtained the harmonic index for $n = 2,3,5,7,8,9$ as shown in the table bellows.

Table 1. The Harmonic Index

n	Harmonic Index
2	1
3	$4/3$
4	$3/2$
5	$8/5$
7	$12/7$
8	$7/4$
9	$16/9$

From these cases, we get some pattern of the harmonic index of the coprime graph of integer group modulo n, and this conjecture is true as stated in the theorem bellows.

Theorem 2
Suppose $\Gamma_{\mathbb{Z}_n}$ coprime graph of the integer group modulo n, If $n = p^k$ is for a p prime number and $k\epsilon\mathbb{N}$ then

$$H(\Gamma_{\mathbb{Z}_n}) = \frac{2n-2}{n}.$$

Proof. Suppose $\Gamma_{\mathbb{Z}_n}$ coprime graph of $\mathbb{Z}_n$ group. Take $n = p^k$, where p is a prime number and $k\epsilon\mathbb{N}$. By definition 3, we obtained $\deg(e) = n - 1$, and $\deg(v) = 1$ for each $v\epsilon\mathbb{Z}_n\backslash\{e\}$ and $uv\epsilon E(G)$ if and only if $\{e\} \subset \{u, v\}$ and $u \neq v$. Obtained harmonic index of the coprime graph of the group $\mathbb{Z}_n$ as follows,

$$H(\Gamma_{\mathbb{Z}_n}) = \sum_{uv\epsilon E(G)} \frac{2}{\deg(u) + \deg(v)}$$

$$H(\Gamma_{\mathbb{Z}_n}) = \sum_{uv\epsilon E(G)} \frac{2}{\deg(e) + \deg(v)}$$

$$H(\Gamma_{\mathbb{Z}_n}) = (n-1)\left(\frac{2}{(n-1)+1}\right) = \left(\frac{2n-2}{n}\right)$$

So, we proved that the harmonic index of the coprime graph of integer group modulo n with $n = p^k$ is $\left(\frac{2n-2}{n}\right)$.■

3.3. The Gutman Index of The Coprime Graph of Integer Modulo Group

In this research, the discussion will be focused on the Gutman index of the coprime graph of integer group modulo n with $n = p^k$ is for some prime p and $k\epsilon\mathbb{N}$.

Example 2
Let $\Gamma_{\mathbb{Z}_n}$ is coprim graph of $\Gamma_{\mathbb{Z}_5}$ with $\Gamma_{\mathbb{Z}_5} = \{0,1,2,3,4\}$. Based on theorem 1, $\Gamma_{\mathbb{Z}_5}$ is a complete bipartite graph. As the result, the degree of a node identity is 4 and another degree of a node is 1 as well as researcher divide by 2 cases. First with the identity we have $(n-1)$ combined and we have the distance of all combined with identity is 1, second without identity we have $= \frac{(n-1)(n-2)}{(2)}$ combine and the distance without identity is 2. Therefore by definition, the result of the Gutman index of $\Gamma_{\mathbb{Z}_5}$ is as follows:

$$Gut(\Gamma_{\mathbb{Z}_5}) = \sum_{\{u,v\}\epsilon V(G)} deg(u)deg(v)d(u,v)$$

$$Gut(\Gamma_{\mathbb{Z}_5}) = \sum_{\{u\}\epsilon v(\mathbb{Z}_5)\backslash\{e\}} deg(u)deg(v)d(u,v) + \sum_{\{u,v\}\epsilon v(\mathbb{Z}_5)\backslash\{e\}} deg(u)deg(v)d(u,v)$$

$$Gut(\Gamma_{\mathbb{Z}_5}) = (4)(4)(1)(1) + (6)(1)(1)(2) = 28$$

With the same steps, obtained the Gutman index for $n = 2,3,5,7,8,9$ as shown in table 2.

Tabel 2. The Gutman index

n	Gutman Index
2	1
3	6
4	15
5	28
7	66
8	91
9	120

From these cases, we had some pattern of the Gutman index of the coprime graph of integer group modulo n as stated in the next theorem.

Theorem 3

Suppose $\Gamma_{\mathbb{Z}_n}$ coprime graph of the integer group modulo n, If $n = p^k$ is for a p prime number and $k\epsilon\mathbb{N}$ then $Gut(\Gamma_{\mathbb{Z}_n}) = (n-1)(2n-3)$

Proof. Suppose $\Gamma_{\mathbb{Z}_n}$ coprime graph of $\mathbb{Z}_n$ group. Take $n = p^k$ a p prime number and $k\epsilon\mathbb{N}$. By definition 4, obtained $\deg(e) = n-1$ dan $\deg(v) = 1$ and based on the definition of 5 and the pattern formed, obtained $d(e,v) = 1$ and $d(u,v) = 2$ if u and v are not equal to e, obtained that many pairs of two different vertices on the $\Gamma_{\mathbb{Z}_n}$ are as follows,

for $d(e,u)$

$$C_1^{n-1} = \frac{(n-1)!}{((n-1)-1)!\,(1)!} = (n-1)$$

for $d(u,v)$

$$C_2^{n-1} = \frac{(n-1)!}{((n-1)-2)!\,(2)!} = \frac{(n-1)(n-2)}{(2)}$$

Then we have

$$Gut(\Gamma_{\mathbb{Z}_n}) = \sum_{\{u,v\}\epsilon V(G)} deg(u)deg(v)d(u,v)$$

$$Gut(\Gamma_{\mathbb{Z}_n}) = \sum_{\{e,v\}\epsilon V(\mathbb{Z}_n)\setminus\{e\}} deg(e)deg(v)d(u,v) + \sum_{\{u,v\}\epsilon V(\mathbb{Z}_n)\setminus\{e\}} deg(u)deg(v)d(u,v)$$

$$Gut(\Gamma_{\mathbb{Z}_n}) = (n-1)(n-1)(1)(1) + \left(\left(\frac{(n-1)(n-2)}{(2)}\right)\right)(1)(1)(2)$$

$$Gut(\Gamma_{\mathbb{Z}_n}) = (n-1)(2n-3)$$

Then we proved the Gutman index of the coprime graph for integer group modulo n with $n = p^k$ is $(n-1)(2n-3)$.■

4. CONCLUSIONS

Based on the research that has been carried out, the results were obtained that the Harmonic index and the Gutman index of the coprime graph of the modulo integer group n with $n = p^k$ for a p prime number and $k\epsilon\mathbb{N}$ successively is $2\left(\frac{n-1}{n}\right)$ and $(n-1)(2n-3)$.

ACKNOWLEDGMENTS

The author would like to thank KPBI Murni Universitas Mataram for financial support for this article and Gamatika Research Club which has provided a forum for its members to study writing, especially in the field of research of mathematics problems.

REFERENCES

[1] A. G. Syarifudin, Nurhabibah, D. P. Malik, and I. G. A. W. dan Wardhana, "Some characterizatsion of coprime graph of dihedral group D2n," *Journal of Physics: Conference Series*, vol. 1722, no. 1, 2021, doi: 10.1088/1742-6596/1722/1/012051.

[2] N. Nurhabibah, A. G. Syarifudin, and I. G. A. W. Wardhana, "Some Results of The Coprime Graph of a Generalized Quaternion Group Q_4n," *InPrime: Indonesian Journal of Pure and Applied Mathematics*, vol. 3, no. 1, pp. 29–33, 2021, doi: 10.15408/inprime.v3i1.19670.

[3] A. Gazir and I. G. A. W. Wardhana, "Subgrup Non Trivial Dari Grup Dihedral," *Eigen Mathematics Journal*, vol. 1, no. 2, p. 73, Dec. 2019, doi: 10.29303/emj.v1i2.26.

[4] X. Ma, H. Wei, and L. Yang, "The Coprime graph of a group," *International Journal of Group Theory*, vol. 3, no. 3, pp. 13–23, 2014, doi: 10.22108/ijgt.2014.4363.

[5] F. Mansoori, A. Erfanian, and B. Tolue, "Non-coprime graph of a finite group," *AIP Conference Proceedings*, vol. 1750, no. June 2016, 2016, doi: 10.1063/1.4954605.

[6] M. Masriani, R. Juliana, A. G. Syarifudin, I. G. A. W. Wardhana, I. Irwansyah, and N. W. Switrayni, "Some Result Of Non-Coprime Graph Of Integers Modulo N Group For N A Prime Power," *Journal of Fundamental Mathematics and Applications (JFMA)*, vol. 3, no. 2, pp. 107–111, 2020, doi: 10.14710/jfma.v3i2.8713.

[7] W. U. Misuki, I. G. A. W. Wardhana, N. W. Switrayni, and Irwansyah, "Some results of non-coprime graph of the dihedral group D2n for n a prime power," *AIP Conference Proceedings*, vol. 2329, no. February, 2021, doi: 10.1063/5.0042587.

[8] E. Y. Asmarani, A. G. Syarifudin, G. Adhitya, W. Wardhana, and W. Switrayni, "Eigen Mathematics Journal The Power Graph of a Dihedral Group," vol. 4, no. 2, 2021, doi: 10.29303/emj.v4i2.117.

[9] T. Chelvam and M. Sattanathan, "Power graph of finite abelian groups," *Algebra and Discrete Mathematics*, vol. 16, no. 1, pp. 33–41, 2013.

[10] N. Nurhabibah, A. Gazir Syarifudin, I. Gede Adhitya Wisnu Wardhana, and Q. Aini, "Eigen Mathematics Journal The Intersection Graph of a Dihedral Group," vol. 4, no. 2, 2021, doi: 10.29303/emj.v4i2.119.

[11] R. Juliana, M. Masriani, I. G. A. W. Wardhana, N. W. Switrayni, and I. Irwansyah, "Coprime Graph Of Integers Modulo N Group And Its Subgroups," *Journal of Fundamental Mathematics and Applications (JFMA)*, vol. 3, no. 1, pp. 15–18, 2020, doi: 10.14710/jfma.v3i1.7412.

[12] H. Hua, K. C. Das, and H. Wang, "On atom-bond connectivity index of graphs," *Journal of Mathematical Analysis and Applications*, vol. 479, no. 1, pp. 1099–1114, Nov. 2019, doi: 10.1016/j.jmaa.2019.06.069.

[13] A. G. Syarifudin, I. G. A. W. Wardhana, N. W. Switrayni, and Q. Aini, "The Clique Numbers and Chromatic Numbers of The Coprime Graph of a Dihedral Group," *IOP Conference Series: Materials Science and Engineering*, vol. 1115, no. 1, p. 012083, 2021, doi: 10.1088/1757-899x/1115/1/012083.

[14] M. Javaid, M. K. Siddique, and E. Bonyah, "Computing Gutman Connection Index of Thorn Graphs," *Journal of Mathematics*, vol. 2021, 2021, doi: 10.1155/2021/2289514.

[15] L. Zhong, "The harmonic index for graphs," *Applied Mathematics Letters*, vol. 25, no. 3, pp. 561–566, Mar. 2012, doi: 10.1016/j.aml.2011.09.059.

Lamp. B34

ORIGINALITY REPORT

10%	9%	4%	0%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Dewi Santri Ramdani, I Gede Adhitya Wisnu Wardhana, Zatta Yumni Awanis. "THE INTERSECTION GRAPH REPRESENTATION OF A DIHEDRAL GROUP WITH PRIME ORDER AND ITS NUMERICAL INVARIANTS", BAREKENG: Jurnal Ilmu Matematika dan Terapan, 2022 Publication	4%
2	www.daten-quadrat.de Internet Source	3%
3	journal.ubb.ac.id Internet Source	3%

Exclude quotes	On	Exclude matches	< 3%
Exclude bibliography	On		