ABSTRACT

BABARAN, JEAN B. 2025. Likelihood of Passing Licensure Exam in Agriculture among USM Graduates using Binary Logistic Regression. BSAM Thesis. College of Science and Mathematics, University of Southern Mindanao, Kabacan, Cotabato. 63 pp

Adviser: **DARYL MAE C. MAMON, MAS**

This study aimed to determine variables affecting passing the 2022 Licensure Examination in Agriculture (LEA) among University of Southern Mindanao (USM) graduates. Binary logistic regression was used to explore the association between LEA results (pass/fail) and the following predictor variables: pre-board exam, sex, civil status, school attended, and course pursued (Agriculture or other related courses). Data from 135 graduates were examined. The outcome surprisingly revealed that no one of the predictor variables covered in the analysis was statistically significant in determining LEA success. Though the estimated coefficients implied potentially strong associations (large magnitudes), the respective standard errors were unusually large, making the estimates unsuitable. This insignificance might be due to a number of factors, including limitations in the dataset, such as small sample size or high multicollinearity among the predictor variables. Also, the model itself could have been misspelled, perhaps excluding important variables or not capturing the intricate dynamics sufficiently. The significant percentage of students attaining between 25 and 49 on the pre-board exam (60.74%) indicates a possible intervention area. In addition, the almost equal division between passing and failing percentages (48.1% and 51.9%) attests

to the difficulty of the test. These findings provide evidence for the need to explore in more detail the factors driving LEA performance. Future studies should investigate larger datasets, include more variables (such as study habits, resource access, pedagogical approaches), and engage more advanced statistical models to more fully understand the multifaceted interaction of factors in achieving success in the LEA. Qualitative research methods might also be rich sources of insight into the lives and attitudes of students.

Keywords: Binary logistic regression, Licensure Examination in Agriculture (LEA), predictive modeling, higher education, statistical significance, maximum likelihood estimation (MLE), Jamovi, model misspecification, multicollinearity, qualitative research.

ABSTRACT

DATANG, MERIAM T. 2025. Analyzing the Trends of Volume of Production of the Corn in the Philippines using ARIMA Model (1987-2023). BSAM Thesis. College of Science and Mathematics, University of Southern Mindanao, Kabacan, Cotabato. 44 pp.

Adviser: **ANNA JEAN S. GARCIA, MAS**

This study utilized the Autoregressive Integrated Moving Average (ARIMA) model to analyze and forecast the trends in corn production in the Philippines using annual data from 1987 to 2023. Given the significance of corn as a staple crop and its vulnerability to climate change and economic shifts, the research aimed to identify production trends, assess model fitness, and forecast future outputs. The data were obtained from the Philippine Statistics Authority (PSA) and were preprocessed to ensure stationarity through the Augmented Dickey-Fuller (ADF) test. The Box-Jenkins methodology was followed, which includes model identification, estimation, and diagnostic checking. After comparing several candidate models based on Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC), ARIMA(1,2,1) was selected as the best-fitting model. The model achieved low error values MAE of 2,167,102.7, RMSE of 2,426,943.7, and MAPE of 29.21% confirming its strong forecasting performance. Diagnostic tests on the residuals indicated randomness and near-normal distribution, validating model adequacy. The 20-year forecast revealed a continuing upward trend in corn production, providing valuable insights for policymakers, agricultural planners, and farmers. Despite its effectiveness, the model does not account for

external factors like seasonal variations, market disruptions, or climate change impacts. As a recommendation, future research should explore more advanced models such as SARIMA or hybrid approaches to improve forecasting accuracy and policy relevance.

Keywords: ARIMA, Corn production, Forecasting, Philippines, Time series analysis, Trend modeling

ABSTRACT

OLYMPAIN, NORMI-ANN L. 2025. Forecasting the Oil Palm Price Mill in Carmen, North Cotabato. BSAM Thesis. College of Science and Mathematics, University of Southern Mindanao, Kabacan, Cotabato.

Adviser: **ANNA JEAN S. GARCIA, MAS**

This research aims to forecast the mill price of oil palm in Carmen, North Cotabato using the Autoregressive Integrated Moving Average (ARIMA) model. The study utilizes monthly data from 2018 to 2022 to analyze historical pricing trends and generate accurate short-term forecasts. The process involves visualizing the time series data, ensuring data stationary through appropriate transformations, identifying the best-fitting ARIMA model using Autocorrelation Function (ACF) and Partial Autocorrelation Function (PACF) plots, and validating the model's forecasting performance. Accurate price forecasting is essential for effective agricultural planning, investment strategies, and risk management, particularly for stakeholders such as farmers, mill operators, local traders, and government agencies. Carmen, North Cotabato is a major contributor to oil palm production in the region, and understanding price behavior plays a critical role in ensuring the sustainability and profitability of the industry. This study contributes to enhancing market intelligence by offering a data-driven tool for anticipating price fluctuations, thus helping stakeholders make informed decisions on production timing, pricing strategies, and resource allocation. Moreover, it highlights the importance of statistical modeling in addressing real-world

agricultural challenges and supports the integration of analytics in regional development initiatives. The results of this research can be utilized as a reference for future studies and can be replicated in other crop-based industries to improve forecasting practices and economic resilience.

Keywords: Agricultural Economics, ARIMA Model, Market Trends, Oil Palm, Price Forecasting, Time Series Analysis

ABSTRACT

JAMELARIN Jr., RONNIE A. 2025. Forecasting Monthly Wholesale Price of Milkfish in the Philippines Under the ARIMA Modeling. BSAM Thesis, College of Science and Mathematics, University of Southern Mindanao, Kabacan, Cotabato. 46 pp

Adviser: **ANNE JEAN S. GARCIA, MAS**

Forecasting the monthly wholesale prices of milkfish in the Philippines is vital for anticipating fluctuations that significantly affect fish farmers, traders, and consumers. This study used the ARIMA (Autoregressive Integrated Moving Average) model based on time series data from 1990 to 2023 to generate reliable short-term forecasts. By analyzing historical trends, testing the stationarity of the time series using the Augmented Dickey-Fuller (ADF) and KPSS tests, and evaluating multiple ARIMA configurations, the study aimed to identify the best-fitting model. A quantitative research design was employed using R software for analysis, with data obtained from the Philippine Statistics Authority (PSA). Among twelve ARIMA models tested, ARIMA(2,1,2) was selected as the most accurate, yielding the lowest prediction errors (MAE = 0.42, MAPE = 0.26, RMSE = 0.49). The model's adequacy was validated using the Ljung-Box test. Forecasts for 2024 revealed a steady decline in prices, from PHP 159.37 in January to PHP 155.32 in December. The findings underscore ARIMA(2,1,2) as an effective tool for forecasting milkfish prices and provide valuable insights for improving decision-making in aquaculture and fisheries

management. The results contribute to better market planning and policy formulation for the agricultural sector.

Keywords: ARIMA, forecasting, milkfish prices, time series, philippines, agricultural economics

ABSTRACT

CAJUTOL, DARLA C. 2025. Exploring normality test methodology with secondary data BSAM Thesis. College of Science and Mathematics, University of Southern Mindanao, Kabacan, Cotabato. 72 pp

Adviser: **DARYL MAE C. MAMON, MAS**

This study investigates the methodologies used to test for normality in datasets, focusing on the application of various statistical normality tests to secondary data. Utilizing exam scores from the University of Southern Mindanao College Entrance Examination (USMCEE) as the dataset, the research aims to determine whether the data follows a normal distribution—an assumption crucial for many parametric statistical methods. The study explores and compares the effectiveness of several well-known normality tests: Kolmogorov-Smirnov, Shapiro-Wilk, Anderson-Darling, Jarque-Bera, Lilliefors, D'Agostino's K-squared, and Cramér–von Mises. Each test's theoretical background, statistical foundations, and practical implications are analyzed. Results from all tests consistently indicated that the USMCEE entrance exam scores do not conform to a normal distribution, emphasizing the necessity of non-parametric alternatives when analyzing such data. This research contributes to a better understanding of how to evaluate normality, particularly when working with secondary data, and offers insights to students and researchers in selecting the most suitable tests for real-world applications.

Keywords: Normality test, secondary data, statistical analysis, USMCEE, parametric assumption, data distribution

ABSTRACT

MASLAMAMA, NORHATA M. 2025. Comparison of the Item Difficulty Estimates on the Mathematics in the Modern World Examination using Different IRT Models. BSAM Thesis. College of Science and Mathematics, University of Southern Mindanao, Kabacan, Cotabato. 64 pp

Adviser: **JONALD L. PIMENTEL, PHD**

The study compared item difficulty estimates for a 50-item multiple-choice midterm exam in "Mathematics in the Modern World" using three Item Response Theory (IRT) models: Rasch, two-parameter logistic (2PL), and three-parameter logistic (3PL). It analyzed responses from 934 students at the University of Southern Mindanao during the first semester of 2023-2024. Results showed that the Rasch and 2PL models produced similar item difficulty classifications, while the 3PL model identified more items as difficult. Statistical comparisons revealed significant differences in difficulty estimates between Rasch and 3PL, as well as 2PL and 3PL, highlighting the impact of model selection. The study concluded that choosing the appropriate IRT model is essential for accurately assessing item difficulty, ensuring fairness and validity in exams. These findings provide valuable insights for educators in improving assessment tools and optimizing test development.

Keywords: Item response theory, mathematics assessment, model comparison, Rasch model, two-parameter logistic model, three-parameter logistic model.

ABSTRACT

LELIS, CARL IVAN P. 2025. The Effect of Option Homogeneity in the Item Difficulty Estimates on a Multiple-Choice Examination Under the Rasch Model. BSAM Thesis. College of Science and Mathematics, University of Southern Mindanao, Kabacan, Cotabato. 53 pp

Adviser: **JONALD L. PIMENTEL, PhD**

This study examined the effect of option homogeneity on item difficulty estimates in multiple-choice examinations. Two test instruments were administered to 257 Applied Statistics students at the University of Southern Mindanao: a pretest with heterogeneous options and a post-test with homogeneous answer choices, containing the same 15 items, with a two-week interval between assessments. Option homogeneity was assessed based on four criteria: format consistency, content relevance, precision, and logical distractors. Item difficulty was estimated using the Rasch model. Results indicated that 12 items increased in difficulty following the shift to homogeneous choices, while 3 items showed decreased difficulty. Furthermore, most items with increased difficulty aligned with the precision and logical distractor criteria. A paired samples t-test confirmed a statistically significant difference in difficulty estimates before and after option homogeneity ($p = 0.013$). These findings can serve as a reference for teachers and test constructors in designing multiple-choice exams, especially if they aim to adjust the difficulty level by modifying the Option homogeneity.

Keywords: Item Difficulty Estimates, Multiple-Choice Test, Option Homogeneity, Rasch Model

ABSTRACT

LISONDRA, MANUEL A. 2025. An Application of Kaplan-Meier Method and Cox Regression Model on the Post-Transplant Outcomes of Solitary and Multi-organ Liver Transplantation. BSAM Thesis. College of Science and Mathematics, University of Southern Mindanao, Kabacan, Cotabato. 79 pp

Adviser: **JONALD L. PIMENTEL, PhD**

Multi-organ transplantation offers life-saving potential for patients suffering from multiple organ failure. However, it presents challenges including post-operative complications and ethical concerns over organ allocation. Despite numerous reports on outcomes of solitary and multi-organ transplants, studies directly comparing cross-organ liver transplant procedures remain limited and often fragmented. In an attempt to address the gap, this study retrospectively analyzed 106,004 first-time transplant patients who underwent isolated liver, simultaneous liver-heart, liver-kidney, or liver-lung transplants from January 1, 2000 to December 31, 2020 using data from the Organ Procurement and Transplantation Network (UNOS-OPTN). The main objectives were to estimate and compare survival outcomes of the four transplant procedures. Survival probability was estimated using Kaplan-Meier method, while Cox regression model was used to compute for the hazard ratio to compare 5-year post-transplant patient survival between transplant groups. Prognostic factors associated with 5-year post-transplant mortality were

identified, using the Cox model, for procedures with sufficient number of events. Average hazard ratio estimation using weighted Cox model was used when proportional hazards assumption was unmet. Findings showed that survival outcomes differed significantly across four procedures (p<0.001) with simultaneous liver-lung transplant having the lowest 5-year survival rate at 66.6% (95% CI: 58.0–76.3), while liver-heart transplantation achieved the highest at 80.8% (95% CI: 76.5–85.3). Furthermore, liver-lung transplant patients faced almost twice the risk of death within five years after transplantation compared to all other procedures. Prognostic factors for liver-only transplant included young recipient age, substantial donor-recipient age difference, elevated creatinine levels, and low total bilirubin at transplant. For liver-kidney procedure, male recipients with low creatinine were linked to 5-year post–transplant mortality. Older donor age and hypoalbuminemia were associated risk factors for both procedures.

Keywords: Liver transplantation, multi-organ transplant, post-transplant mortality, survival analysis, survival rates

ABSTRACT

VICTORIA, DESIREE G. 2025. Forecasting the Exchange Rates of US Dollar to Philippine Peso using ARIMA Time Series Analysis, BSAM Thesis. College of Science and Mathematics, University of Southern Mindanao, Kabacan, Cotabato. 70 pp

Adviser: **JONALD L. PIMENTEL, PhD**

This research used AutoRegressive Integrated Moving Average (ARIMA) time series modeling to predict the US dollar's value in relation to the Philippine peso. Particularly, aimed to examine historical exchange rate fluctuations from January 2010 to December 2023 for reasons to the crucial role that exchange rates play in financial decision-making and economic stability. To guarantee reliability, data were acquired from the Bangko Sentral ng Pilipinas (BSP). The Box-Jenkins technique was used, which included model identification, parameter estimation, and diagnostic checking. Based on statistical criteria, such as the Bayesian Information Criterion (BIC) and the Akaike Information Criterion (AIC), the study analyzed various ARIMA models. Results showed that, the ARIMA (1,1,1) model was the best model for forecasting future changes in the exchange rate. Further, the results indicated that, with an Adjusted R-squared of 0.9827, a BIC of 308.48, and an AIC of 299.13, the ARIMA (1,1,1) model offered the best-fit. Forecast evaluation criteria, which produced a Mean Absolute Percentage Error (MAPE) of 1.07230, a Root Mean Squared Error (RMSE) of 0.73090, a Mean Absolute Error (MAE) of 0.60009, and a Mean Squared Error (MSE) of 0.53422, validated its accuracy. Although the model did not take seasonal variations into consideration,

diagnostic tests verified that it successfully represented trends and short-term dependencies. Additionally, the results provided useful information for economists, financial managers, and policymakers in reducing the risks brought on by exchange rate volatility. As a recommendation, to account for seasonal fluctuations and increase forecasting accuracy, future studies might investigate seasonal models like SARIMA and future research should also consider analyzing exchange rates on a daily basis, to better capture short-term fluctuations and market volatility.

Keywords: ARIMA, Exchange rate forecasting, Financial modeling, Philippine peso, Time series analysis, US dollar.

ABSTRACT

JONGCO, ROY D. 2025. Forecasting the Farmgate Prices of Dry Palay of Cotabato Province. BSAM Thesis. College of Science and Mathematics, University of Southern Mindanao, Kabacan, Cotabato. 35 pp

Adviser: **ANNA JEAN S. GARCIA, MAS**

This study aimed to forecast the farmgate prices of dry palay in Cotabato Province using the Auto-Regressive Integrated Moving Average (ARIMA) model. The research began by visualizing the time series data of dry palay prices to understand their behavior over time. Initial analysis revealed that the original price series was non-stationary, necessitating first differencing to achieve stationarity. The study then employed Autocorrelation Function (ACF) and Partial Autocorrelation Function (PACF) charts to identify suitable ARIMA model parameters. Model selection was guided by the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC), ensuring the best balance between model fit and complexity. Results indicated that the ARIMA(0,1,1) model was the most appropriate for capturing the underlying dynamics of dry palay prices in Cotabato. This model demonstrated strong predictive performance, evidenced by low Mean Absolute Error (MAE), Root Mean Squared Error (RMSE), and Mean Absolute Percentage Error (MAPE) values. Additionally, forecast errors showed no significant outliers, confirming the model's consistency and robustness. The study successfully generated a 72-month forecast of dry palay prices using this model, projecting a continuous increase in farmgate prices over the forecast horizon.

Notably, the forecast retained seasonal characteristics, reflecting persistent seasonal patterns in price movements.The findings have practical implications for stakeholders in the agricultural sector, including farmers, traders, and policymakers. Accurate price forecasts can reduce market uncertainty, support strategic decision-making in production and marketing, and inform policy interventions aimed at enhancing market efficiency. Ultimately, this study contributes a reliable forecasting tool that can aid in stabilizing and improving the dry palay market in Cotabato Province.

Keywords: Arima, dry palay, farmgate, forecasting.

ABSTRACT

BENEMERITO, IVY JOY O. 2025. Optimal Routes Using Dijkstra's Algorithm and Graph Models. BSAM Thesis. College of Science and Mathematics, University of Southern Mindanao, Kabacan, Cotabato. 83 pp

Adviser: **JUPITER G. PILONGO, MS**
Co-Adviser: **LAWTON JOHN A. YABES, MS (Cand.)**

Finding the shortest path plays an essential part in resolving network-related problems. A key challenge in road networks is determining the most efficient routes between different locations. Although various shortest path algorithms have been developed to tackle this issue, the problem of identifying optimal paths remains significant in many real-world applications.

This study explored the application of Dijkstra's Algorithm in optimizing routes across the University of Southern Mindanao's Main Campus. The selected locations include routes from the College of Agriculture Main Building to the Graduate School, from the College of Business, Development Economics and Management to the College of Human Ecology and Food Sciences, and from the College of Trades and Industries Main Building to the University Learning Resource Center. The campus was modeled as a weighted directed graph, with college buildings and road intersections as vertices (nodes), and distances between them as weighted edges. Through this graph model, the algorithm calculated the most efficient paths between the specified buildings.

The analysis showed that the shortest path from the College of Agriculture Main Building to the Graduate School passed through vertices 1-2-3-4-6-7-8. The

route from the College of Business, Development Economics and Management to the College of Human Ecology and Food Sciences followed vertices 1-2-4-6-8-10-12-14-15. Lastly, the path from the College of Trades and Industries Main Building to the University Learning Resource Center included vertices 1, 3, 5, 7, and 8.

Keywords: Algorithms, dijkstra's algorithm, graph theory, shortest path, tora

ABSTRACT

ISMAEL, HANNIN K. 2025. Tic-Tac-toe on Graphs: It's Winning and Drawing Strategies. BSAM Thesis. College of Science and Mathematics, University of Southern Mindanao, Kabacan, Cotabato. 58 pp.

Adviser:**JUPITER G. PILONGO,MS**
Co-Adviser:**LAWTON JOHN A. YABES, MS Cand.**

This study explored the game of Tic-Tac-Toe on graphs as an extension of the classical version of the game. By modeling the game on graph structures such as paths, cycles, and grid graphs, the research investigated how structural properties of graphs influence strategic outcomes. Using combinatorial game theory, the study analyzed win conditions, optimal strategies, and the effects of different graph parameters on gameplay. Key theorems were presented to characterize winning strategies on specific families of graphs, and generalized grid graphs. The study also introduced new graph-based variants and proved results about their solvability and fairness. The findings contribute to the field of recreational mathematics and suggest directions for further exploration in mathematical game theory and graph theory education.

Keywords: Combinatorial Game theory, Tic-tac-toe on graphs, Winning strategies, Drawing Strategies,

ABSTRACT

ANDOG, NORHAIN L. 2025. Determinants on the Odds of Passing the LET of the USM Students Under Binary Logistic Model and Probit Regression Model. BSAM Thesis. College of Science and Mathematics, University of Southern Mindanao, Kabacan, Cotabato. 50 pp

Adviser: **DARYL MAE C. MAMON, MAS**

This study aimed to identify the factors influencing the outcomes of the Licensure Examination for Teachers (LET) examination in March 2024 at the University of Southern Mindanao, which involved 272 examinees. Specifically, the research sought to model these factors using both binary logistic regression and probit regression to determine the better-fitting model. Based on the findings, both the binary logistic and probit regression models significantly identified review status and examiner status as key variables for passing the LET at the University of Southern Mindanao. Specifically, first-time takers demonstrated a higher likelihood of passing compared to repeat examinees, and attending a review session was associated with higher odds of success than not attending. The binary logistic model was identified as the best-fit model, and it revealed that examinees who both attend a review and are first-time takers exhibit a high predicted probability of success.

Keywords: Binary Logistic Regression, Examiner Status, LET Passers, Probit Regression , Review Status

ABSTRACT

LABAS, ALADIN M. 2025. Applications of Graph Theory to Course Timetable Scheduling using Graph Coloring. BSAM Thesis. College of Science and Mathematics, University of Southern Mindanao, Kabacan, Cotabato. Number of pages, 84 pp.

Adviser: **JUPITER G. PILONGO, MS**
Co-Adviser: **LAWTON JOHN A. YABES, MS Cand.**

This study aimed to develop a graph representation model for the scheduling of programs under the College of Science and Mathematics. Second, it implemented the Bania-Duarah and Greedy algorithms in Python Software to generate graph coloring outputs. Lastly, it analyze how these graph outputs corresponded to graph realization within the framework of graph theory. The method involved representing each course as a vertex in a graph, and courses scheduled on the same day and same time represented as edges. The resulting graphs revealed that these adjacent courses formed complete subgraphs or cliques, which could not share the same color or room. Applying graph coloring allowed for the determination of the chromatic number, or the minimum number of colors required to schedule all courses without conflict. Results showed that the chromatic number for each schedule graph was consistently less than the number of rooms used in the original data. The findings demonstrated that the proposed graph-based model provided an efficient and systematic approach to reducing room usage and preventing conflicts.

Keywords: Chromatic number, course timetable scheduling, graph coloring, graph realization, graph theory

ABSTRACT

HADJI SABIL, JOHARIS B. 2025. Generalized Topologies Induced from Maximal Paths of Directed Graph. BSAM Thesis. College of Science and Mathematics, University of Southern Mindanao, Kabacan, Cotabato. 38 pp

Adviser: **PHILIP LESTER P. BENJAMIN, PhD**

This study seeks to establish a foundation for examining the properties of directed graphs through their corresponding generalized topological spaces. A generalized topology (GT) μ on a nonempty set X is defined as a family of subsets of X that contains the empty set and is closed under arbitrary unions. In this paper, we introduce a new generalized topology based on the edges that constitute the maximal paths of a directed graph D, termed the maximal path edge generalized topology (MPEΓ), and represented as ΓMP(D).

The fundamental topological properties and connectedness within this new structure are examined and demonstrated. Specifically, the paper shows that (E(D), ΓMP (D)) forms a robust generalized topological space and provides a characterization of its open and closed sets. Additionally, it is established that the MPEΓ space of any disconnected digraph is ΓMP -disconnected, while the MPEΓ space of a connected digraph is also thoroughly described.

Keywords: Generalized Topology, Maximal Paths, Directed Graph, Graph.

ABSTRACT

LIMPUAK, NORHANA M. 2025, Characterizing Super Strongly Perfect Graphs; BSAM Thesis. College of Science and Mathematics, University of Southern Mindanao, Kabacan, Cotabato. 46 pp.

Adviser: **SANDRA A. NANDING, MS**

A graph G is super strongly perfect graph if every induced subgraph H and G has a minimal dominating set that meets all the maximal cliques of H. This study explores the concept of super strongly perfect graphs, focusing on their properties and characterizations within specific graph classes. In particular, we investigate whether certain special graphs such as Wheel graphs, Bipartite graphs, Complete Bipartite graphs and Ladder graphs satisfy the conditions of super strongly perfect graphs. To enhance understanding, illustrations are provided to support the results.

Keywords: bipartite graphs, complete bipartite graphs, ladder graphs, super strongly perfect graphs, wheel graphs.

ABSTRACT

ANDOYUGEN, NASROLAH B. 2025, An Overview of Some Strongly Perfect Graphs; BSAM Thesis. College of Science and Mathematics, University of Southern Mindanao, Kabacan, Cotabato. 29 pp

Adviser: **SANDRA A. NANDING, MS**

A strongly perfect graph is a graph G such that every induced subgraph H of G has an independent vertex set meeting all maximal cliques of H. In this paper, we introduced and discussed the idea of the strongly perfect, that is, determine if some special graphs can be considered as strongly perfect graph. In particular, we investigate whether certain special graphs such as Bull graphs, Star graphs, Ladder graphs and Fan graphs satisfy the condition of strongly perfect graphs. To enhance understanding, illustration are provided to support the results.

Keywords: bull graphs, fan graphs, ladder graphs, star graphs, strongly perfect graph.

ABSTRACT

LIDASAN, SAMRA E. 2025. Perfect Dominating Sets in the Join of Graphs. BSAM Thesis. College of Science and Mathematics, University of Southern Mindanao, Kabacan, Cotabato. 64 pp.

Adviser: **LEONARD M. PALETA, PhD**

A perfect dominating set of a graph $G = (V, E)$ is a subset $S \subseteq V$ such that every vertex not in S is adjacent to exactly one vertex in S. This concept extends the idea of a domination in graphs by imposing a stricter condition on how non-dominating vertices is covered. This study explored the concept of a perfect dominating sets, focusing on the join of two graphs, particularly on some special graphs such as paths and cycles. The objective was to determine the perfect domination numbers of these joined graphs. Furthermore, combinatorial techniques and structural analysis were applied to derive exact values and observe patterns. To enhance understanding, some illustrations are provided to support the results.

Keywords: Graph theory, Join of graphs, Perfect domination