



# UTHM

Universiti Tun Hussein Onn Malaysia

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## GROUP 2 PROJECT

### APPLICATION IN REAL LIFE OF TRANSPORTATION AND LOGISTIC ALGEBRA

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COURSE CODE	BIC10303
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COURSE NAME	ALGEBRA
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FACULTY	FAKULTI SAINS KOMPUTER & TEKNOLOGI (FSKTM)
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## GROUP MEMBERS PICTURE



MOHAMAD ARIF  
AZINUDDIN BIN ZAIDI



ABDUL ALIF BIN ABDUL  
GHAFOOR



AQMAL DANIAL BIN  
MUHAMAD TAQIYUDIN



MUHAMMAD ADAM  
YUSRY BIN MOHD NAZIR



JUNESH KUMAR A/L  
NAHINDRAN KUMAR



MUHAMMAD NABIL ZAIDAN  
BIN ABDUL HAQ

## 1.0 INTRODUCTION

### TRIGGER 2: TRANSPORTATION AND LOGISTIC



When it comes to selling physical goods, logistics and transportation management can make or destroy a company. Because logistics management covers transportation and associated expenses, the two usually go hand in hand. When you combine the two together in most firms, however, you get a long chain of various activities and responsibilities that, when put together properly, convey raw materials from point A to the client at point B. Transportation and logistics management are two business segments that work together to achieve a shared goal. The primary purpose is to efficiently and effectively convey merchandise across a company's supply chain. Transportation management is a subset of logistics, despite the fact that the phrases are sometimes used interchangeably. It's a symbiotic connection that needs attention and care. Actively managing your supply chain may save your firm a lot of money and effort. In other words, you can't afford to miss out on chances because this critical service function isn't prioritised.

Logistics is a set of actions that assures that the correct items, in the appropriate quantities, are available to the right customers at the right time. Logistics operations serve as a link between production and consumption, effectively acting as a bridge between production and market or supplier locations separated by distance and time. This necessitates a focus on items or tangible goods, as well as people and data on goods and people. At different phases of a product's life cycle, different values are added to it. Transportation, defined as the actual, physical movement of products and people between two sites, is critical

to the success of any supply chain since it transports items as they travel through the chain. The moving of commodities from one site to another is referred to as transportation in the context of trade. It is regarded as a sub-unit of logistics. Products are delivered by land, air, or sea. A transportation and distribution service's survival depends on efficient transportation. Efficient transportation, as well as cost-effective packaging that assures minimal investment and product safety, should be examined for the optimum delivery route.

Algebra is a field of mathematics that uses alphabetical letters to solve problems with unknown numbers. Variables are another name for these letters. Constants are values that are known in the provided phrase, such as numbers. Algebra entails simple mathematical operations such as addition, subtraction, multiplication, and division that use both constants and variables. Algebra is a crucial life skill that should be well-understood. It prepares us for statistics and calculus by going beyond fundamental math. It is valuable for a variety of vocations, including ones that a student may pursue as a second career. Algebra comes in handy around the house and while studying news stories. It's also attractive and fosters rational thinking. Therefore algebra is needed in transportation and logistics to solve some problems. Some of the algebra problems are the amount of transportation made in one year, total number of companies that use to send packages, and *et cetera*. With this we can see that algebra is needed to solve our problems in our life.

## 2.0 BACKGROUND OF PROJECT



In this project, we will use our algebraic skills to solve problems based on our selected trigger which is trigger 2, transportation and logistics. Transportation is the movement of goods and logistics is the management of the inward and outward transportation of goods from the manufacturer to the end user. These terms are often used interchangeably, but they are two extremely different parts of the supply chain. Next is industry is **a group of companies that are related based on their primary business activities**. In modern economies, there are dozens of industry classifications. Individual companies are generally classified into an industry based on their largest sources of revenue. Nowadays industry moves very fast , as we know The Fourth Industrial Revolution (4IR) is expected to change how we live, work, and communicate; it is also likely to change the things we value and the way we value them in the future. Presently, we can already see changing business models and employment trends.

Industry is a term used to describe a set of businesses or organisations that generate or supply goods, services, or revenue. In economics, logistics are divided into primary, secondary, tertiary, and quaternary categories; secondary industries are further divided into heavy and light categories. Agriculture, forestry, fishing, mining, quarrying, and mineral exploitation are all part of this sector of a country's economy. It can be divided into two types: genetic industry, which includes the production of raw materials that can be enhanced by human involvement in the manufacturing process, and extractive industry, which includes the manufacture of finite raw materials that cannot be replenished by cultivation.

Furthermore, the logistics function is Transportation and warehousing are the two major functions of logistics. Transportation management focuses on planning, optimising and executing the use of vehicles to move goods between warehouses, retail locations and

customers. The transportation is multimodal and can include ocean, air, rail and roads. Not surprisingly, transportation management is a complex process that involves planning and optimising routes and shipment loads, order management, freight auditing and payment. It can also extend to yard management, a process which oversees the movement of vehicles through the yards outside manufacturing plants, warehouses and distribution facilities. Carrier management is an important aspect since the price, availability and capacity of transportation carriers can vary widely.

Besides that, logistics is important because a well-established third-party logistics partner will reduce your organisational load. These guys will come with smart and practical ideas for increasing the effectiveness of supply chain logistics methods that are not inefficient, uncluttered, and quantifiable. To minimise the possibility of transportation operations and store locations getting out of hand, a good logistics strategy is critical. Stakeholder cooperation should be a major element of your overall logistics strategy. you should design your sourcing strategies to take into account your consumers' changing needs To deliver strong business outcomes, an effective logistics plan should incorporate The productivity rate at which items should be distributed across warehouses or distribution centres and every month you need to provide an evaluation of your logistics relationships.

Logistics are also important because significant logistics tactics accomplish more than just promoting excellent outcomes for your corporation. Additionally, these tactics provide value to your consumers. The more accessible your items are to your clients, the more valuable your commodity may become. Adding value to clients does not have to mean sacrificing quality or quantity. Additionally, it relates to accessibility. Because improved logistics makes your goods more accessible to a broader audience, sensible company leaders see it as a critical instrument for delivering value for consumers.

Increased demand also increases the value of some things as they become more widely accessible. Always revise your plan if an issue has a negative influence on your consumers. By addressing distribution or transportation-related concerns, you may provide value for them. If difficulties such as warehouse overflow continue to affect some consumers, you may change your service to improve customer satisfaction and address this issue.

Apart from that, we also use several mathematical problems. First is polynomials, sequence and series, and matrices. After finishing all the mathematics problems we choose one of the questions and solution to do coding using C language. Finally we do pseudocode to complete our group assignments.



### 3.0 PROBLEM FORMULATION

#### 3.1 Polynomial Questions:



1. Encik Alif just bought his brand-new car Toyota GT 86. He wants to refuel his car with a full tank. There are two options for him to confirm either RON95 or RON97 that he can refuel his car for full tank. For his information, the maximum volume that a Toyota GT 86 can fill up is 50 litres. You need to help Encik Alif to do a simple calculation to make sure his money is enough to refuel his car tank because he only brings RM120.

Variable	$a$	$b$
Types	RON95	RON97
Price	RM2.05	RM2.99



2. Today, Pak Aqmal started to deliver all his customer boxes as he works with J&T company. There are 3 types of boxes which he will load in the van; when we multiply p, q, and r, we will get the value of box volume. [*Volume = Width x Length x Height*]

Type	Width (inch) (p)	Length (inch) (q)	Height (inch) (r)
Box 1	10.0	15.0	12.0
Box 2	18.0	11.0	17.5
Box 3	16.5	19.0	21.5



3. Based on question 2:

The van only has 3200 litres for load space. Pak Aqmal needs to deliver 35 of Box 1, 52 of Box 2 and 19 of Box 3. You need to calculate the total volume of all the boxes in litres and lastly, you need to justify how many trips Pak Aqmal needs to do, to completely deliver all the boxes. [  $1 \text{ inch}^3 = 0.016387064 \text{ litres}$  ]



4. Abu wants to calculate the volume of a cargo container. The height of cargo is given as 2.6m, while the length and the width is unknown. It is stated that the width is 3.6m more than the length and the volume of this container is  $37.44\text{m}^3$ . Given the information, calculate the length of the container. [*Volume = Width x Length x Height*]
5. Encik Hamdan plans to make a side income by doing a business in the field of delivering purpose and doing services for transfer goods. He is seeking a financial advisor to make sure his budget is enough to buy a new vehicle to run his new business. He already plans to buy Toyota Hilux(4X4), Hiace van, or Isuzu Lorry.

Type of Vehicle	Toyota Hilux(4X4)	Hiace van	Isuzu Lorry
			
Price (RM)(x)	120,000	80,000	230,000

Encik Hamdan's salary is (z) and the minimum salary that Encik Hamdan should have is RM 1000. Next the system will do a calculation to decide if he should need a guarantor or not and it is based on the system requirement. Deposit he will give when he has already decided which vehicle is (y). Encik Hamdan also can choose when he wants to settle the balance but it must be less than 11 year and he will be taxed 10%.

#### Formula for payment purposes

Balance = Price(x) - Deposit(y)

Monthly payment = [Price(x) - Deposit(y)]/Months

Total payment = 110% x [Balance(x-y)/Months]

**Formula for guarantor**

Kpi = Salary(z)/2

$$\frac{\text{part}}{\text{whole}} \times 100 = \%$$



6. A movie club charges a one-time fee of \$25, which allows members to purchase movies for \$7 each. Another club does not charge a fee and sells movies for \$12 each. How many movies must a member purchase for the cost of the two clubs to be equal?





### 3.2 Sequences and Series Questions:



1. The Silverstone company produced 8,000,000 tyres in 2006. In the next year, the company produced 10,000 greater than the previous year. Find the total production of the tyre in 2021.

$$S_n = a + (a+d) + (a+2d) + (a+3d) + \dots + (a+(n-2)d) + (a+(n-1)d)$$

$$S_n = (a+(n-1)d) + (a+(n-2)d) + \dots + (a+3d) + (a+2d) + (a+d) + a$$

Sum operation:

$$2S_n = (2a+(n-1)d) + (2a+(n-1)d) + \dots + (2a+(n-1)d) + (2a+(n-1)d)$$

$$= n(2a+(n-1)d)$$

$$S_n = \frac{n}{2} [2a + (n-1)d]$$



2. A deposit of RM50000 is made in the stock of a motorcar company (Proton Company) that earns 2.5% compounded yearly. The funds in the stock after  $n$  years is given by

$$A_n = 50000 (1 + r)^{n-1}, n = 1, 2, 3, \dots$$

- Compute the first five terms of the sequence.
- Find the value of funds after 25 years by computing  $A_{25}$ .
- The terms are increasing. Is the rate of growth of the terms increasing? Explain.

$$\sum_{n=1}^{\infty} ar^{n-1} =$$

$$\sum_{n=0}^{\infty} ar^n =$$

$$\{ar^{1-1} + ar^{2-1} + ar^{3-1} + ar^{4-1} + \dots\}$$

$$\{ar^0 + ar^1 + ar^2 + ar^3 + \dots\}$$

$$\{ar^0 + ar^1 + ar^2 + ar^3 + \dots\}$$

$$a \{r^0 + r^1 + r^2 + r^3 + \dots\}$$

$$a \{r^0 + r^1 + r^2 + r^3 + \dots\}$$

$$a \{1 + r + r^2 + r^3 + \dots\}$$

$$a \{1 + r + r^2 + r^3 + \dots\}$$



- The temperature of the engine car is 125 degree Celsius when Encik Arif turns off the engine. The temperature of the engine will decrease 15% every 5 minutes.
  - Find a formula for the  $n$ th term of the geometric sequence that gives the temperature of the engine  $n$  minutes after being turned off and leaving the car.
  - Find the temperature of the engine 20 minutes after being turned off and leaving the car.
  - Estimate when the engine has the same temperature as the environment temperature. (**Environment temperature = 25 ° Celsius**)

$$\sum_{n=1}^{\infty} ar^{n-1} =$$

$$\sum_{n=0}^{\infty} ar^n =$$

$$\{ar^{1-1} + ar^{2-1} + ar^{3-1} + ar^{4-1} + \dots\}$$

$$\{ar^0 + ar^1 + ar^2 + ar^3 + \dots\}$$

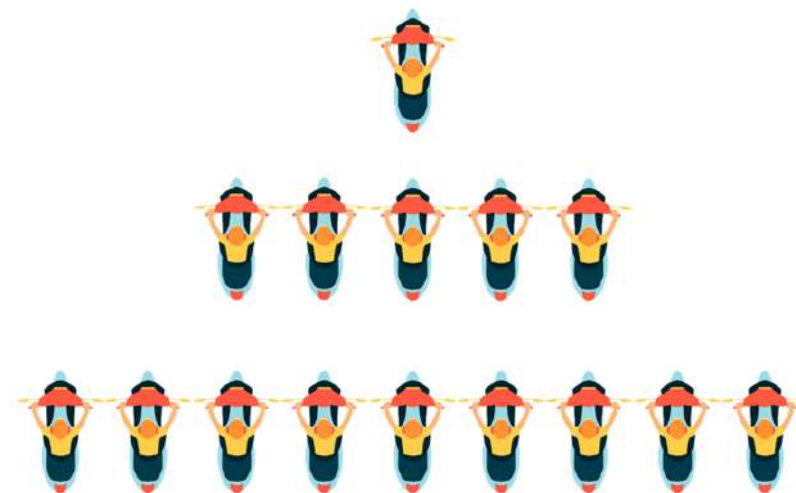
$$\{ar^0 + ar^1 + ar^2 + ar^3 + \dots\}$$

$$a \{r^0 + r^1 + r^2 + r^3 + \dots\}$$

$$a \{r^0 + r^1 + r^2 + r^3 + \dots\}$$

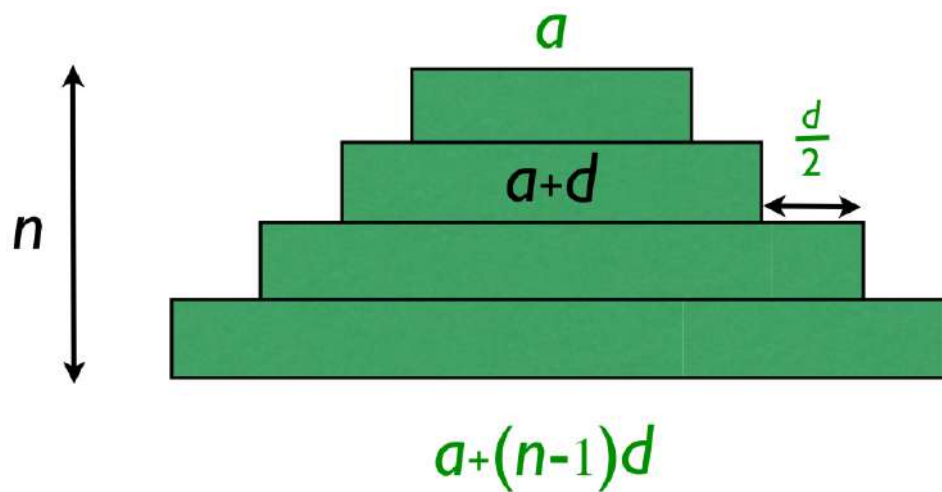
$$a \{1 + r + r^2 + r^3 + \dots\}$$

$$a \{1 + r + r^2 + r^3 + \dots\}$$



4. Motorcycles are queued as shown in the figure. The top row has 1 motorcycle, and the bottom row has 9 motorcycles. [  $T_n = a + (n-1) d$  ]

- Find a formula for the ***n*th** term of this situation.
- Compute the next 3 rows.
- Find the motorcycles for **8th** row.



5. Picture above shows the process of making a car. In a month a certain car producer produced 200 cars a month. Because of high demand for the car model, the number is increased by 10 more cars in the month. Therefore, calculate the total number of cars produced in a year assuming that the number of car increases is static.

$$S_n = \frac{n}{2} [2a + (n - 1)d]$$





6. Ahmad is doing an investigation on how many cars are at the traffic light when the light is still red. From his observation that at the start there were only 2 cars waiting. If the waiting time for the traffic light to turn green is 2 minutes, how many cars are there if there is an increase of 3 cars per 5 second.

$$S_n = \frac{n}{2} [2a + (n - 1)d]$$



7. THERE ARE SOME SQUARE SHAPE PLATE AND EACH OF IT CONTAINS A RICE GRAIN. THE FIRST SQUARE CONTAINS 1 RICE, THE SECOND SQUARE CONTAINS 2 RICE, THE 3<sup>RD</sup> SQUARE CONTAINS 4 RICE GRAIN AND THE 4<sup>TH</sup> ONE CONTAINS 8 RICE GRAINS AND SO ON. The farmer begins to count each rice on each square plate. THE SEQUENCE WILL BE LIKE 1, 2, 3, 4, 8, 16, 32 ... OR  $\{2^0, 2^1, 2^2, 2^3, 2^4 \dots 2^{63}\}$ , THIS IS A GEOMETRIC PROGRESSION. USING THE FORMULA OF SUMMATION OF A GEOMETRIC PROGRESSION WHICH IS WEIGHING ABOUT 1,199,000,000,000 METRIC TONS (assuming 65 mg as the mass of one grain of rice). Find the total years it would take for him to complete his count on each square plate.

$$S_n = a_1 + a_1 r + a_1 r^2 + \dots + a_1 r^{n-2} + a_1 r^{n-1}$$

$$rS_n = a_1 r + a_1 r^2 + \dots + a_1 r^{n-2} + a_1 r^{n-1} + a_1 r^n$$

$$S_n - rS_n = a_1 + 0 + 0 + \dots + 0 + 0 - a_1 r^n$$

$$S_n - rS_n = a_1 - a_1 r^n$$

$$S_n (1-r) = a_1 (1-r^n) \quad s_n = \frac{a_1 (1-r^n)}{1-r} \quad (r \neq 1)$$

### 3.3 Matrices Questions:



1. The speed,  $v(t)$  of a delivery truck can be defined as  $v(t) = at^2 + bt + c$ , where  $a$ ,  $b$ , and  $c$  are constant. It is given that at the  $t=3$ ,  $t=6$  and  $t=9$ , the speed of the respective  $t$  is 25, 45, and 75 km/h. With the information given, calculate the speed of the delivery truck at  $t=16$ .

Operation description	Notation
<b>Row operations</b>	
1. Interchange rows $i$ and $j$	$R_i \leftrightarrow R_j$
2. Multiply row $i$ by $s$ , where $s \neq 0$	$sR_i \rightarrow R_i$
3. Add $s$ times row $i$ to row $j$	$sR_i + R_j \rightarrow R_j$



2. Three express logistics companies Poslaju, J&T and NinjaVan want to ship their packages using three types of transportation. Total shipping costs for the three companies are \$295, \$360 and \$154.

Poslaju	J&T	Ninja Van
30 sea	15 sea	6 sea
15 air	20 air	8 air
10 land	20 land	9 land

Using Gauss Jordan elimination method, find the cost per kilo for each type of transportation.

$$\left[ \begin{array}{ccc|c} 1 & 0 & 0 & * \\ 0 & 1 & 0 & * \\ 0 & 0 & 1 & * \end{array} \right]$$



3. The prices of three motorcycles X, Y and Z are a, b and c per unit respectively. Aqmal purchases 4 units of Y and sells two units of X and 5 units of Z. Alif purchases 2 units of Z and sells 3 units of X and one unit of Y. Adam purchases one unit of X and sells 3 units of Y and one unit of Z. In the process, Aqmal, Alif and Adam earn RM15000, RM1000 and RM4000 respectively. Find the prices per unit of X, Y and Z. (Use matrix inversion method to solve the problem)

$$A = \begin{bmatrix} a & b \\ c & d \end{bmatrix} \quad A^{-1} = \frac{1}{|A|} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$$

## 4.0 SOLUTIONS USING ALGEBRA METHODS

### 4.1 Polynomial Answers:

1.

For RON95:

$$a \times 50 = 50a = 50(2.05) = \text{RM}102.50$$

For RON97:

$$b \times 50 = 50b = 50(2.99) = \text{RM}149.50$$

= Therefore, Encik Alif should choose RON95 because the total amount to be paid is RM102.50, so this amount is enough.

2.

Volume = Width x Length x Height

Answer: Box 1

$$\begin{aligned}\text{Volume} &= p \times q \times r \\ &= 10.0 \times 15.0 \times 12.0 \\ &= 1800.00 \text{ inch}^3\end{aligned}$$

Answer: Box 2

$$\begin{aligned}\text{Volume} &= p \times q \times r \\ &= 18.0 \times 11.0 \times 17.5 \\ &= 3465.00 \text{ inch}^3\end{aligned}$$

Answer: Box 3

$$\begin{aligned}\text{Volume} &= p \times q \times r \\ &= 16.5 \times 19.0 \times 21.5 \\ &= 6740.25 \text{ inch}^3\end{aligned}$$

3.

$$35 \times 1800.00 \text{ inch}^3 = 63000.00 \text{ inch}^3$$

$$52 \times 3465.00 \text{ inch}^3 = 180180.00 \text{ inch}^3$$

$$19 \times 6740.25 \text{ inch}^3 = 128806.75 \text{ inch}^3$$

$$\text{Total volume of all boxes} = 153124.75 \text{ inch}^3$$

$$\text{Total volume of all boxes in litres} = 153124.75 \text{ inch}^3 \times 0.016387064 = 25092 \text{ litres}$$

$$\frac{25092}{3200} = \frac{6273}{800} = 7.841 \text{ trips}$$
$$\approx 8 \text{ trips}$$

Therefore, Pak Aqmal needs to deliver the boxes in 8 trips to complete all the tasks.

4.

Volume = length x height x width

$$x (2.6) \times (x + 3.6) = 37.44$$

$$x (x + 3.6) = 14.4$$

$$x^2 + 3.6x - 14.4 = 0$$

$$(x + 6) (5x - 12) = 0$$

$$x = -6, x = \frac{12}{5}$$

Because  $x$  cannot be negative  $x = \frac{12}{5}$  is or 2.4 m is chosen as an answer.

5.

Choice: Toyota Hilux

Balance: RM 120,000 – RM 10,000

Balance: RM 110,000

Years: 10 = 120 months

$$\frac{\text{RM } 110,000}{120}$$

Monthly Payment: RM 916

Tax: 110% x RM 916

Total Monthly Payment including Tax: RM 1,007.60

$$\text{KPI: } \frac{\text{RM}4500}{2}$$

KPI: RM 2250.00

6.

- A movie club charges a one-time fee of \$25, which allows members to purchase movies for \$7 each.

$$A = 25 + 7n \quad (\text{Eq. 1})$$

- Another club does not charge a fee and sells movies for \$12 each.

$$B = 12n \quad (\text{Eq. 2})$$

Equate the Eq. 1 and the Eq. 2:

$$A = B$$

$$25 + 7n = 12n$$

$$12n = 25 + 7n \quad [\text{Switch sides}]$$

$$12n - 7n = 25 \quad [\text{By the subtraction property of equality, subtract } 7n \text{ on both sides}]$$

$$5n = 25 \quad [\text{combined like terms}]$$

$$n = \frac{25}{5}$$

$$\therefore n = 5$$

Hence, a member must purchase 5 movies for the cost of the two clubs to be equal.

## 4.2 Sequences and Series Answers:

1.

$$\text{Formula} = \frac{n}{2}(2a+(n-1)d)$$

Answer:

$$a = 8,000,000$$

$$d = 10,000$$

$$n = 2021-2006$$

$$= 15$$

$$= \frac{15}{2}(2(8,000,000)+(15-1)10,000)$$

$$= 121,050,000 \text{ units}$$

So, the total amount of tires produced in 2006 until 2021 is 121,050,000 units.



2.

a)

$$a = 50000$$

$$r = 0.025$$

$$n = 1$$

$$\begin{aligned}\text{Ans} &= 50000 (1 + 0.025)^{1-1} \\ &= 50000\end{aligned}$$

when  $n = 2$

$$\begin{aligned}\text{Ans} &= 50000 (1 + 0.025)^{2-1} \\ &= 51250\end{aligned}$$

when  $n = 3$

$$\begin{aligned}\text{Ans} &= 50000 (1 + 0.025)^{3-1} \\ &= 52531.25\end{aligned}$$

when  $n = 4$

$$\begin{aligned}\text{Ans} &= 50000 (1 + 0.025)^{4-1} \\ &= 53844.53\end{aligned}$$

when  $n = 5$

$$\begin{aligned}\text{Ans} &= 50000 (1 + 0.025)^{5-1} \\ &= 55190.64\end{aligned}$$

b)  $n = 25$

$$\begin{aligned}&= 50000(1+0.025)^{25-1} \\ &= \text{RM } 90436.30\end{aligned}$$

c) Rate of growth of the terms is directly proportional to the terms. Thus, the rate of growth of the terms increases.

3.

a) Formula =  $a(r)^{n-1}$

b)  $a = 125$

$$r = (1 - 0.15)$$

$$= 0.85$$

$$= 125(0.85)^{n-1}$$

$$n = 1 = 5\text{min}$$

$$n = 4 = 20\text{min}$$

$$= 125(0.85)^{4-1}$$

$$= 76.77^\circ \text{Celsius}$$

c)  $n = ?$

$$a = 125$$

$$r = 0.85$$

$$\text{Temperature} = 25^\circ \text{C}$$

$$125(0.85)^{n-1} = 25$$

$$[(0.85)^{n-1} = \frac{25}{125}] \times \log$$

$$(n-1) \log (0.85) = \log \left(\frac{1}{5}\right)$$

$$n-1 = \frac{\log \left(\frac{1}{5}\right)}{\log (0.85)}$$

$$n = 9.90 + 1$$

$$n = 10.9$$

$$n = 11$$

4.

$$\begin{aligned} \text{a) } a &= 1 \\ d &= 5 - 1 \\ d &= 4 \end{aligned}$$

$$\begin{aligned} T_n &= 1 + (n-1) 4 \\ T_n &= 4n-3 \end{aligned}$$

$$\begin{aligned} \text{b) } a &= 1 \\ d &= 9-5 \\ &= 4 \\ n &= 4, 5, 6 \end{aligned}$$

$$\begin{aligned} \text{When } n &= 4 \\ &= 1+(4-1)4 \\ &= 13 \end{aligned}$$

$$\begin{aligned} \text{When } n &= 5 \\ &= 1+(5-1)4 \\ &= 17 \end{aligned}$$

$$\begin{aligned} \text{When } n &= 6 \\ &= 1+(6-1)4 \\ &= 21 \end{aligned}$$

$$\begin{aligned} \text{c) } n &= 8 \\ &= 1+(8-1)4 \\ &= 29 \end{aligned}$$

5.

$$a = 200$$

$$d = 10$$

$$S_{10} = ?$$

$$S_n = \frac{n}{2} [ 2a_1 + (n-1) d ]$$

$$\begin{aligned} S_{10} &= \frac{10}{2} [ 2 (200) + (9) 10 ] \\ &= 2450 \end{aligned}$$

In conclusion there are total of 2450 cars produced in the year.

6.

$$a = 2$$

$$d = 3$$

$$S_n = \frac{n}{2} [ 2a_1 + (n-1) d ]$$

$$\begin{aligned} S_{24} &= \frac{24}{2} [ 2(2) + (23) 3 ] \\ &= 876 \text{ cars} \end{aligned}$$

In conclusion there 876 cars that can be observed at the traffic light.

7.

$$S_n = \frac{a(r^n - 1)}{r - 1}$$

where,  $n = 63$ ,  $r = 2$ ,  $a_1 = 1$

$$s_{64} = 2^{64} - 1 = 18,446,744,073,709,551,615$$

### 4.3 Matrices Answers:

1.

Since  $v(4) = 25$ ,  $v(8) = 45$  and  $v(12) = 75$ , the linear equation can be form is

$$9a + 4b + c = 25$$

$$36a + 8b + c = 45$$

$$81a + 12b + c = 75$$

Solve this using Gauss elimination method

$$\left[ \begin{array}{ccc|c} 9 & 4 & 1 & 25 \\ 36 & 8 & 1 & 45 \\ 81 & 12 & 1 & 75 \end{array} \right] \rightarrow \left[ \begin{array}{ccc|c} 9 & 4 & 1 & 25 \\ 0 & 8 & 3 & 55 \\ 81 & 12 & 1 & 75 \end{array} \right] \rightarrow \left[ \begin{array}{ccc|c} 9 & 4 & 1 & 25 \\ 0 & 8 & 3 & 55 \\ 0 & 24 & 8 & 150 \end{array} \right] \rightarrow \left[ \begin{array}{ccc|c} 9 & 4 & 1 & 25 \\ 0 & 8 & 3 & 55 \\ 0 & 0 & 1 & 15 \end{array} \right]$$

Which can be turn back into

$$9a + 4b + c = 25$$

$$8b + 3c = 55$$

$$c = 15$$

Using the information that has been calculated

$$b = \frac{[55 - 3(15)]}{8} = \frac{5}{4}$$

$$a = \frac{[25 - 4(5/4) - 15]}{9} = \frac{34}{45}$$

Thus,

$$v(16) = \left(\frac{34}{45}\right) \times (16)^2 + \left(\frac{5}{4}\right) \times 16 + 15 = 228.42$$

2.

$$30s + 15a + 10l = 295$$

$$15s + 20a + 20l = 360$$

$$6s + 8a + 9l = 154$$

$$\begin{bmatrix} 30 & 15 & 10 \\ 15 & 20 & 20 \\ 6 & 8 & 9 \end{bmatrix} \begin{bmatrix} 295 \\ 360 \\ 154 \end{bmatrix} \rightarrow \begin{bmatrix} 30 & 15 & 10 \\ 0 & 25 & 30 \\ 6 & 8 & 9 \end{bmatrix} \begin{bmatrix} 295 \\ 425 \\ 154 \end{bmatrix} \rightarrow \begin{bmatrix} 30 & 15 & 10 \\ 0 & 25 & 30 \\ 0 & 5 & 7 \end{bmatrix} \begin{bmatrix} 295 \\ 425 \\ 95 \end{bmatrix} \rightarrow \begin{bmatrix} 30 & 15 & 10 \\ 0 & 25 & 30 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 295 \\ 425 \\ 10 \end{bmatrix}$$

We can turn this back into,

$$30s + 15a + 10l = 295$$

$$25a + 30l = 425$$

$$l = 10$$

Using the formula,

$$a = \frac{425 - 30(10)}{25} = 5$$

$$b = \frac{295 - 10(10) - 15(5)}{30} = 4$$

So,

$$\text{Land} = 10, \text{Air} = 5, \text{Sea} = 4$$

3.

$$2a - 4b + 5c = 15000$$

$$3a + b - 2c = 1000$$

$$-a + 3b + c = 4000$$

$$A = \begin{bmatrix} 2 & -4 & 5 \\ 3 & 1 & -2 \\ -1 & 3 & 1 \end{bmatrix}$$

$$\text{adj } A = \begin{bmatrix} 7 & -1 & 10 \\ 19 & 7 & -2 \\ 3 & 19 & 14 \end{bmatrix}$$

$$\text{adj } A = \begin{bmatrix} 7 & 19 & 3 \\ -1 & 7 & 19 \\ 10 & -2 & 14 \end{bmatrix}$$

$$|A| = 2(1 + 6) + 4(3 - 2) + 5(9 + 1)$$

$$= 2(7) + 4(1) + 5(10)$$

$$= 14 + 4 + 50$$

$$|A| = 68$$

$$A^{-1} = \frac{1}{68} \begin{bmatrix} 7 & 19 & 3 \\ -1 & 7 & 19 \\ 10 & -2 & 14 \end{bmatrix}$$

$$\begin{bmatrix} a \\ b \\ c \end{bmatrix} = \frac{1}{68} \begin{bmatrix} 7 & 19 & 3 \\ -1 & 7 & 19 \\ 10 & -2 & 14 \end{bmatrix} \begin{bmatrix} 15000 \\ 1000 \\ 4000 \end{bmatrix}$$

$$= \frac{1}{68} \begin{bmatrix} (105000 + 19000 + 120000) \\ (-15000 + 7000 + 76000) \\ (150000 - 2000 + 56000) \end{bmatrix}$$



$$a = \left(\frac{1}{68}\right) (136000) = 2000$$

$$b = \left(\frac{1}{68}\right) (68000) = 1000$$

$$c = \left(\frac{1}{68}\right) (204000) = 3000$$

## 5.0 SOLUTIONS USING PROGRAMMING

### 5.1 Question :

Encik Hamdan plans to make a side income by doing a business in the field of delivering purpose and doing services for transfer goods. He is seeking a financial advisor to make sure his budget is enough to buy a new vehicle to run his new business. He already plans to buy Toyota Hilux(4X4), Hiace van, or Isuzu Lorry.

Type of Vehicle	Toyota Hilux(4X4)	Hiace van	Isuzu Lorry
			
Price (RM)(x)	120,000	80,000	230,000

Encik Hamdan's salary is (z) and the minimum salary that Encik Hamdan should have is RM 1000. Next the system will do a calculation to decide if he should need a guarantor or not and it is based on the system requirement. Deposit he will give when he has already decided which vehicle is (y). Encik Hamdan also can choose when he wants to settle the balance but it must be less than 11 year and he will be taxed 10%.

#### Formula for payment purposes

Balance = Price(x) - Deposit(y)

Monthly payment = [Price(x) - Deposit(y)]/Months

Total payment = 110% x [Balance(x-y)/Months]

#### Formula for guarantor

Kpi = Salary(z)/2

## 5.2 Coding :

```
3          GROUP 2 (FINANCIAL ADVISOR)
4
5          coded & commented by Arif
6
7  *****/
8  //declare header
9  #include <stdio.h>
10 #include <string.h>
11 #include <math.h>
12
13 //declare function
14 void main()
15 {
16     //declare identifier data types
17     char query;
18     char name[50];
19     char status[15];
20     char note[70];
21     char type_vehic[20];
22     char price[15];
23     int table, subtraction, month, settlement;
24     double taxes, kpi;
25
26     //for re-enter this program without end function
27     again:
28
29     //dummy header of the program
30     printf("\n< WELCOME TO FINANCIAL ADVISOR PROGRAM [GROUP 2] >\n");
31     printf("CALCULATE YOUR MONTHLY FEE WHEN YOU BUYING A VEHICLE\n\n");
32
33     //input from user
34     //user need to input a name
35     printf("\nEnter your name (e.g : Arif) = ");
36     scanf("%s", &name);
```

```

38 //declare blacklist for receive number input and blacklistRead for inval
39 int blacklist = 1;
40 int blacklistRead = 0;
41
42 //loop do-while-while)if-else statement for age
43 do
44 {
45 printf("\nAre you blacklist (1:Blacklist 2:Whilelist) = ");
46 blacklistRead = scanf("%d", &blacklist);
47
48 while(blacklistRead != 1)
49 {
50 printf("--That is not a number!! Please Try Again :) -- \n");
51 scanf("%*[^\\n]");
52 printf("Please insert a number for your status : ");
53 blacklistRead = scanf("%d", &blacklist);
54 }
55
56 //if-else statement for classify status of user
57 if(blacklist==1)
58 {
59 strcpy(status,"Blacklist");
60 printf("\nSorry you cannot proceed :( \n");
61 break;
62 }
63 else
64 {
65 strcpy(status,"Whilelist");
66 printf("\nYou can proceed :) \n");
67 }
68 }
69 while(blacklist<1 || blacklist>2);
70
71 //feedback to user
72 printf("-- Your Status is Valid :v --\n");

```

```

74 //display menu for user choose the type of vehicle
75 printf("\n\tVEHICLES MENU\n");
76 printf("\n#####");
77 printf("\n# 1:   Toyota Hilux           #");
78 printf("\n# 2:   Hiace Van               #");
79 printf("\n# 3:   Isuzu Lorry              #");
80 printf("\n#####\n");
81
82 //declare vehicle for receive number input and vehicleRead for invalid
83 int vehicle = 0;
84 int vehicleRead = 1;
85
86 //(loop do-while-while)if-else statement for age
87 do
88 {
89     printf("\nSelect type of vehicles (1-3) = ");
90     vehicleRead = scanf("%d", &vehicle);
91
92     while (vehicleRead != 1)
93     {
94         printf("--That is not a number!! Please Try Again :) -- \n");
95         scanf("%*[^\\n]");
96         printf("Please insert a number for your choice : ");
97         vehicleRead = scanf("%d", &vehicle);
98     }

```

```

100 //if-else statement to determine vehicle cost
101 if(vehicle==1)
102 {
103     printf(" --Your Number is Valid--\n");
104     strcpy(type_vehic, "Toyota Hilux");
105     printf("You have chose Toyota Hilux\n\n");
106 }
107 else if(vehicle==2)
108 {
109     printf(" --Your Number is Valid--\n");
110     strcpy(type_vehic, "Hiace Van");
111     printf("You have chose Hiace Van\n\n");
112 }
113 else if(vehicle==3)
114 {
115     printf(" --Your Number is Valid--\n");
116     strcpy(type_vehic, "Isuzu Lorry");
117     printf("You have chose Isuzu Lorry\n\n");
118 }
119 else
120 {
121     printf(" --Invalid Number. Try Again Boss :) --\n");
122 }
123 }
124 while(vehicle<1 || vehicle>3);

```

```

126 //switchcase for vehicle
127 switch(vehicle)
128 {
129     case 1:
130         printf("Toyota Hilux price : RM 120,000");
131         break;
132     case 2:
133         printf("Hiace Van price : RM 80,000");
134         break;
135     case 3:
136         printf("Isuzu Lorry : RM 230,000");
137         break;
138     default:
139         printf(" --You Enter the Wrong Choice!!!-- ");
140 }
141
142 //dummy question
143 printf("\n\nDo you want to proceed with the deposit amount? [PRESS ANY KEY]");
144 scanf("%s", &query);

```

```

146 //declare deposit for receive number input and depositRead for invalid al
147 int deposit = 0;
148 int depositRead = 1;
149
150 //((loop do-while-while) for deposit
151 do
152 {
153     printf("\nEnter your deposit amount (RM 50,000) = RM ");
154     depositRead = scanf("%d", &deposit);
155
156     while (depositRead != 1)
157     {
158         printf("--That is not a number!! Please Try Again :) -- \n");
159         scanf("%*[^\\n]");
160         printf("Please insert a number for your deposit : ");
161         depositRead = scanf("%d", &deposit);
162     }
163
164 //if-else statement for amount deposit
165 if(deposit>=1000 && deposit<230001)
166 {
167     printf("\n --Amount accepted-- \n");
168 }
169 else
170 {
171     printf("\n --Amount not accepted-- \n");
172 }
173 }
174 while(deposit<1000 || deposit>230000);

```

```

176 //switchcase for vehicle that will calculate the balance
177 switch(vehicle)
178 {
179     case 1:
180
181         subtraction = 120000-deposit;
182         printf("\nBalance calculation for Toyota Hilux");
183         printf("\nRM 120,000 - RM %d",deposit);
184         printf("\nBalance : RM %d", subtraction);
185         strcpy(price, "RM 120,000");
186         break;
187
188     case 2:
189
190         subtraction = 80000-deposit;
191         printf("\nBalance calculation for Hiace Van");
192         printf("\nRM 80,000 - RM %d",deposit);
193         printf("\nBalance : RM %d", subtraction);
194         strcpy(price, "RM 80,000");
195         break;
196
197     case 3:
198
199         subtraction = 230000-deposit;
200         printf("\nBalance calculation for Isuzu Lorry");
201         printf("\nRM 230,000 - RM %d",deposit);
202         printf("\nBalance : RM %d", subtraction);
203         strcpy(price, "RM 230,000");
204         break;
205
206     default:
207         printf("\n --Invalid. Please Try Again :) -- \n");
208 }
209 while(deposit<1000 || deposit>230000);

```

```

211 //declare year for receive number input and yearRead for invalid alphabe
212 int year = 0;
213 int yearRead = 1;
214
215 //(loop do-while-while) for balance
216 do
217 {
218     printf("\nHow many year/years do you want to settle the balance? (not mo
219     yearRead = scanf("%d", &year);
220
221     while (yearRead != 1)
222     {
223         printf("--That is not a number!! Please Try Again :) -- \n");
224         scanf("%*[^\\n]");
225         printf("Please insert a number for your deposit : ");
226         yearRead = scanf("%d", &year);
227     }
228
229     //if-else statement for checking validation of year
230     if(year>0 && year<11)
231     {
232         printf("\n --Valid-- \n");
233     }
234     else
235     {
236         printf("\n --Invalid!! Please Try Again-- \n");
237     }
238 }
239 while(year<1 || year>10);

```

```

241 //declare formula for month and settlement
242 month = year*12;
243 settlement = subtraction/month;
244
245 printf("\nRM %d that you need to pay for %d years", subtraction, year);
246 printf("\n\nTotal payment without taxes RM %d for %d months", settlement, month);
247
248 //declare formula for taxes
249 taxes=1.1*settlement;
250
251 printf("\n\nTotal payment including taxes RM %.2f for %d months", taxes, month);

```



```

257 // (loop do-while-while) for salary
258 do
259 {
260 printf("\n\nEnter your monthly salary (minimum RM 1000): RM ");
261 salaryRead = scanf("%d", &salary);
262
263 while (salaryRead != 1)
264 {
265 printf("--That is not a number!! Please Try Again :) -- \n");
266 scanf("%*[^\\n]");
267 printf("Please insert a number for your deposit : ");
268 salaryRead = scanf("%d", &salary);
269 }
270
271 //if-else statement to determine that salary accepted or not
272 if(salary>=1000)
273 {
274 printf("\n --Salary Accepted-- \n");
275 }
276 else
277 {
278 printf("\n --Salary not Accepted!! Please Try Again :) -- \n");
279 }
280 }
281 while(salary<999 || salary>10000);

```

```

283 //declare formula for kpi
284 kpi = salary/2;
285
286 //if-else statement to determine that user need guarantor or not
287 if(kpi<taxes)
288 {
289 strcpy(note,"You need a guarantor to purchase this vehicle");
290 printf("\n\nYou need a guarantor to purchase this vehicle");
291 }
292 else
293 {
294 strcpy(note,"You can proceed to purchase this vehicle");
295 printf("\n\nYou can proceed to purchase this vehicle");
296 }

```

```

298 //output for user
299 printf("\n\n -----Summary-----");
300 printf("\nName\t : %s", name);
301 printf("\nStatus\t : %s", status);
302 printf("\nVehicle\t : %s", type_vehic);
303 printf("\nDeposit\t : RM %d", deposit);
304 printf("\nBalance\t : RM(x)-RM(y) = %s - RM %d", price ,deposit);
305 printf("\nBalance\t : RM %d", subtraction);
306 printf("\nYear\t : %d years", year);
307 printf("\nMonthly Payment\t : [RM(x) - RM(y)] / Months");
308 printf("\nMonthly Payment\t : [%s - RM %d] / %d months", price, deposit, month);
309 printf("\nMonthly Payment\t : RM %d", settlement);
310 printf("\nTax\t : 110 percent x RM %d", settlement);
311 printf("\nMonthly Payment including tax : RM %.2f", taxes);
312 printf("\nMonthly Salary\t : RM %d", salary);
313 printf("\nKPI\t : RM(z)/2 = RM %d / 2", salary);
314 printf("\nKPI\t : RM %.2f", kpi);
315 printf("\nNote\t : %s", note);
316
317 //dummy end program
318 printf("\n\n=====THANK YOU=====");

```

```

320 //declare end_task for receive number input and end_taskRead for invalid alphabet
321 int end_task = 1;
322 int end_taskRead = 0;
323
324 //((loop do-while-while)if-else statement for end_task
325 do
326 {
327 printf("\n\nPress '1' if you want to re-enter the input and \nPress '2' to end this program :) : ");
328 end_taskRead = scanf("%d", &end_task);
329
330 while (end_taskRead != 1)
331 {
332 printf("--That is not a number!! Please Try Again :) -- \n");
333 scanf("%*[^\\n]");
334 printf("Please insert a number for this question: ");
335 end_taskRead = scanf("%d", &end_task);
336 }
337
338 //if-else statement for end the program or re-enter the input
339 if(end_task==1)
340 {
341 goto again;
342 }
343 else if(end_task==2)
344 {
345 printf("\n=====END OF PROGRAM=====\\n");
346 break;
347 }
348 else
349 {
350 printf("\\n-- Invalid Number !! Please Try Again :) --\\n");
351 }
352 }
353 while(end_task<1 || end_task>2);
354
355 }

```

### 3.2 Pseudocode :

```
START
again:
READ Name
READ Blacklist
    IF Blacklist==1
        DISPLAY "Blacklist"
        DISPLAY " Sorry you cannot proceed :( "
        BREAK
    ELSE
        DISPLAY "Whitelist"
        DISPLAY " You can proceed :) "
        DISPLAY " -- Your Status is Valid :v -- "
DISPLAY "VEHICLES MENU'
DISPLAY "#####"
DISPLAY "# 1: Toyota Hilux      #"
DISPLAY "# 2: Hiace Van         #"
DISPLAY "# 3: Isuzu Lorry        #"
DISPLAY "#####"
DISPLAY "Select type of vehicles (1-3) = "
READ Vehicle
    IF Vehicle==1
        DISPLAY "Toyota Hilux"
        DISPLAY "You have chose Toyota Hilux"
    ELSE IF Vehicle==2
        DISPLAY "Hiace Van"
        DISPLAY "You have chose Hiace Van"
    ELSE IF "Vehicle==3
        DISPLAY "Isuzu Lorry"
        DISPLAY "You have chose Isuzu Lorry"
    ELSE
        DISPLAY "--Invalid Number. Try Again Boss :) --"
switchcase based on number
case 1:
    DISPLAY "Toyota Hilux price : RM 120,000"
case 2:
    DISPLAY "Hiace Van price : RM 80,000"
case 3:
    DISPLAY "Isuzu Lorry : RM 230,000"
default:
    DISPLAY "--You Enter the Wrong Choice!!!--"
DISPLAY "Do you want to proceed with the deposit amount? [PRESS ANY
KEY AND ENTER TO CONTINUE]"
DISPLAY "Enter your deposit amount (RM 50,000) = RM "
READ Deposit
    IF (deposit>=1000 && deposit<230001)
```

```

        DISPLAY "--Amount accepted--"
    ELSE
        DISPLAY "--Amount not accepted--"
switchcase for balance,x calculation
    case 1:
        COMPUTE Balance = 120000-deposit
        DISPLAY "Balance calculation for Toyota Hilux"
        DISPLAY "RM 120,000 - RM %d"
        DISPLAY "Balance : RM %d"
    case 2:
        COMPUTE Balance = 80000-deposit
        DISPLAY "Balance calculation for Hiace Van"
        DISPLAY "RM 120,000 - RM %d"
        DISPLAY "Balance : RM %d"
    case 1:
        COMPUTE Balance = 230000-deposit
        DISPLAY "Balance calculation for Isuzu Lorry"
        DISPLAY "RM 120,000 - RM %d"
        DISPLAY "Balance : RM %d"
    default (deposit<1000 || deposit>230000):
        DISPLAY "--Invalid. Please Try Again :) --"
DISPLAY "How many year/years do you want to settle the balance? (not more
than 10 years) : "
READ Year
    IF(year>0 && year<11)
        DISPLAY "--Valid--"
    ELSE
        DISPLAY "--Invalid!! Please Try Again--"
COMPUTE month = year*12
COMPUTE settlement = subtraction/month
DISPLAY "RM %d that you need to pay for %d years"
DISPLAY "Total payment without taxes RM %d for %d months"
COMPUTE taxes=1.1*settlement
DISPLAY "Total payment including taxes RM %.2f for %d months"
DISPLAY "Enter your monthly salary (minimum RM 1000): RM "
READ Salary
    IF(salary>=1000)
        DISPLAY "--Salary Accepted--"
    ELSE
        DISPLAY "--Salary not Accepted!! Please Try Again :) --"
COMPUTE kpi = salary/2
    IF(kpi<taxes)
        DISPLAY "You need a guarantor to purchase this vehicle"
    ELSE
        DISPLAY "You can proceed to purchase this vehicle"
DISPLAY "-----Summary-----"
DISPLAY Name
DISPLAY Status

```

```

DISPLAY Vehicle
DISPLAY Deposit
DISPLAY RM(x) - RM(y) = RM %d
DISPLAY Balance
DISPLAY Year
DISPLAY Monthly Payment : [RM(x) - RM(y)] / Months
DISPLAY Monthly Payment : [%s - RM %d] / %d months
DISPLAY Monthly Payment
DISPLAY Tax = 110 percent x RM %d
DISPLAY Monthly Payment including tax
DISPLAY Monthly Salary
DISPLAY KPI = RM(z)/2 = RM %d/2
DISPLAY KPI
DISPLAY Note
DISPLAY "=====THANK YOU===== "

DISPLAY "Press '1' if you want to re-enter the input and"
DISPLAY "Press '2' to end this program :) : "
READ End_task
    IF(end_task==1)
        GOTO again:
    ELSEIF(end_task==2)
        DISPLAY "=====END OF PROGRAM===== "
        BREAK
    ELSE
        DISPLAY "-- Invalid Number !! Please Try Again :) --"
END

```

## 5.4 Output :

### 5.4.1 Toyota Hilux

```
< WELCOME TO FINANCIAL ADVISOR PROGRAM [GROUP 2] >
CALCULATE YOUR MONTHLY FEE WHEN YOU BUYING A VEHICLE

Enter your name (e.g : Arif) = Hamdan

Are you blacklist (1:Blacklist 2:Whilelist) = 2

You can proceed :)
-- Your Status is Valid :v --

          VEHICLES MENU

#####
# 1:  Toyota Hilux          #
# 2:  Hiace Van             #
# 3:  Isuzu Lorry           #
#####

Select type of vehicles (1-3) = 1
  --Your Number is Valid--
You have chose Toyota Hilux

Toyota Hilux price : RM 120,000

Do you want to proceed with the deposit amount? [PRESS ANY KEY AND ENTER TO CONTINUE]
1

Enter your deposit amount (RM 50,000) = RM 10000

  --Amount accepted--

Balance calculation for Toyota Hilux
RM 120,000 - RM 10000
Balance : RM 110000
How many year/years do you want to settle the balance? (not more than 10 years) : 10

  --Valid--
```

```

RM 110000 that you need to pay for 10 years

Total payment without taxes RM 916 for 120 months

Total payment including taxes RM 1007.60 for 120 months

Enter your monthly salary (minimum RM 1000): RM 4500

--Salary Accepted--

You can proceed to purchase this vehicle

-----Summary-----
Name      : Hamdan
Status    : Whilelist
Vehicle   : Toyota Hilux
Deposit   : RM 10000
Balance   : RM(x)-RM(y) = RM 120,000 - RM 10000
Balance   : RM 110000
Year      : 10 years
Monthly Payment : [RM(x) - RM(y)] / Months
Monthly Payment : [RM 120,000 - RM 10000] / 120 months
Monthly Payment : RM 916
Tax        : 110 percent x RM 916
Monthly Payment including tax : RM 1007.60
Monthly Salary   : RM 4500
KPI             : RM(z)/2 = RM 4500 / 2
KPI             : RM 2250.00
Note           : You can proceed to purchase this vehicle

=====THANK YOU=====

Press '1' if you want to re-enter the input and
Press '2' to end this program :) : 2

=====END OF PROGRAM=====

```

### 5.4.2 Hiace Van

```
< WELCOME TO FINANCIAL ADVISOR PROGRAM [GROUP 2] >
CALCULATE YOUR MONTHLY FEE WHEN YOU BUYING A VEHICLE

Enter your name (e.g : Arif) = Hamdan

Are you blacklist (1:Blacklist 2:Whilelist) = 2

You can proceed :)
-- Your Status is Valid :v --

      VEHICLES MENU

#####
# 1:  Toyota Hilux      #
# 2:  Hiace Van         #
# 3:  Isuzu Lorry       #
#####

Select type of vehicles (1-3) = 2
--Your Number is Valid--
You have chose Hiace Van

Hiace Van price : RM 80,000

Do you want to proceed with the deposit amount? [PRESS ANY KEY AND ENTER TO CONTINUE]
1

Enter your deposit amount (RM 50,000) = RM 7000

--Amount accepted--

Balance calculation for Hiace Van
RM 80,000 - RM 7000
Balance : RM 73000
How many year/years do you want to settle the balance? (not more than 10 years) : 8

--Valid--
```



```

RM 73000 that you need to pay for 8 years

Total payment without taxes RM 760 for 96 months

Total payment including taxes RM 836.00 for 96 months

Enter your monthly salary (minimum RM 1000): RM 3300

--Salary Accepted--

You can proceed to purchase this vehicle

-----Summary-----
Name      : Hamdan
Status    : Whilelist
Vehicle   : Hiace Van
Deposit   : RM 7000
Balance   :  $\text{RM}(x) - \text{RM}(y) = \text{RM } 80,000 - \text{RM } 7000$ 
Balance   : RM 73000
Year      : 8 years
Monthly Payment :  $[\text{RM}(x) - \text{RM}(y)] / \text{Months}$ 
Monthly Payment :  $[\text{RM } 80,000 - \text{RM } 7000] / 96 \text{ months}$ 
Monthly Payment : RM 760
Tax       : 110 percent x RM 760
Monthly Payment including tax : RM 836.00
Monthly Salary  : RM 3300
KPI        :  $\text{RM}(z)/2 = \text{RM } 3300 / 2$ 
KPI        : RM 1650.00
Note       : You can proceed to purchase this vehicle

=====THANK YOU=====

Press '1' if you want to re-enter the input and
Press '2' to end this program :) : 2

=====END OF PROGRAM=====

```

### 5.4.3 Isuzu Lorry

```
< WELCOME TO FINANCIAL ADVISOR PROGRAM [GROUP 2] >
CALCULATE YOUR MONTHLY FEE WHEN YOU BUYING A VEHICLE

Enter your name (e.g : Arif) = Hamdan

Are you blacklist (1:Blacklist 2:Whilelist) = 2

You can proceed :)
-- Your Status is Valid :v --

      VEHICLES MENU

#####
# 1:  Toyota Hilux      #
# 2:  Hiace Van         #
# 3:  Isuzu Lorry       #
#####

Select type of vehicles (1-3) = 3
  --Your Number is Valid--
You have chose Isuzu Lorry

Isuzu Lorry : RM 230,000

Do you want to proceed with the deposit amount? [PRESS ANY KEY AND ENTER TO CONTINUE]
1

Enter your deposit amount (RM 50,000) = RM 20000

  --Amount accepted--

Balance calculation for Isuzu Lorry
RM 230,000 - RM 20000
Balance : RM 210000
How many year/years do you want to settle the balance? (not more than 10 years) : 10

  --Valid--
```

```

RM 210000 that you need to pay for 10 years

Total payment without taxes RM 1750 for 120 months

Total payment including taxes RM 1925.00 for 120 months

Enter your monthly salary (minimum RM 1000): RM 5500

--Salary Accepted--

You can proceed to purchase this vehicle

-----Summary-----
Name      : Hamdan
Status    : Whilelist
Vehicle   : Isuzu Lorry
Deposit   : RM 20000
Balance   :  $RM(x) - RM(y) = RM\ 230,000 - RM\ 20000$ 
Balance   : RM 210000
Year      : 10 years
Monthly Payment :  $[RM(x) - RM(y)] / Months$ 
Monthly Payment :  $[RM\ 230,000 - RM\ 20000] / 120\ months$ 
Monthly Payment : RM 1750
Tax       : 110 percent x RM 1750
Monthly Payment including tax : RM 1925.00
Monthly Salary  : RM 5500
KPI        :  $RM(z)/2 = RM\ 5500 / 2$ 
KPI        : RM 2750.00
Note      : You can proceed to purchase this vehicle

=====THANK YOU=====

Press '1' if you want to re-enter the input and
Press '2' to end this program :) : 2

=====END OF PROGRAM=====

```

## 6.0 CONCLUSION AND DISCUSSION

The major purpose of this project is to solve mathematical problems of Transportation and Logistic using mathematical solutions by making a pseudocode and designing a programming to solve the problem in C language. Throughout the process, we came out with many real-life situations about the mathematical problem of Transportation and Logistic. The problems have been divided into 3 categories which are polynomial, matrix and sequence and series. After we study the problems, we discuss and make a proper solution for the problems and choose the best scenario to make a pseudocode and design a program in C language. While we were creating and looking for a solution to this mathematical problem, we found that the matrix problem was the most difficult problem to put into programming. So we decided to take the polynomial problem and design the programming in C language.

Based on the first output of the programming, Alif (name entered by user) chose Toyota Hilux, and the price is RM 120,000. He enters his deposit amount which is RM 10,000 and he needs to pay the remaining of the car's price which is RM 110,000 in 10 years (Alif chose to pay in 10 years). The total payment to include taxes is RM 1,007.60 for 120 months and the program will ask Alif, his monthly salary to verify if Alif is eligible to pay the monthly payment or not. Alif entered RM4,500 and he was eligible. The program then shows the summary for Alif. Then, the program will ask Alif if he wants to re-enter the program by pressing 1 or end the program by pressing 2. For the next output, the program first will ask Aqmal, if he is blacklist or whitelist and Aqmal chose Whitelist and program will ask Alif which vehicles that he desires to buy and he chose Hiace Van which is number 2 in vehicles menu. The program then shows the price which is RM 80,000. Next, Aqmal needed to enter his deposit to proceed with this program and he entered RM 7,000. Aqmal needs to pay the remaining price, RM 73,000 in 8 years based on Aqmal's choice. Then, this program will calculate total payment for each month for 96 months and show the result that Aqmal needs to pay RM 836 per month for 96 months. The program then asks for Aqmal's salary, and he enters for RM 3,300. Then the program shows the summary of this program, and we can see that Aqmal can proceed to purchase his desired vehicle in the note section. This program will end if Aqmal presses 2 or if there's false input entered by him, he can easily re-enter the input back and he needs to press 1. Same goes for the last output for the

third vehicle, Isuzu Lorry that cost RM 230,000. Hamdan wants this vehicle and needs to enter this program same as Alif and Aqmal. Hamdan needs to verify whether he is blacklist or whitelist by entering number 1 for blacklist or 2 for whitelist, he enters his deposit (RM 20,000) and the program shows his status is valid to proceed the program. Next, the program calculates the remaining amount that Hamdan needs to pay using a very simple calculation which is the vehicle's price minus deposit and the remaining amount that Hamdan needs to pay is RM 210,000. Hamdan wants to pay the remaining amount in 10 years so this program will calculate the amount that he needs to pay per month and the result is he needs to pay RM 1925 for 120 months and this had included taxes. The program asked Hamdan his salary to proceed with this program and Hamdan entered RM 5,500. The program shows the summary as a sign that Hamdan is eligible to purchase this vehicle. Hamdan entered number 2 at the end of this program section to end this program and proceed with his payment.

In conclusion, we can realize that math in nature is factual in its tangibility. Math was defined at the start of the chapter as the science of rigorous proof. It is this outstanding quality that makes the use of math in solving the problem of Transportation and Logistic. Too often we force mathematical concepts on the basis of blind faith, while examples such as these are all around us. However, learning how to solve a problem and design a program is a difficult endeavor that requires a complete understanding of the situation. Math knowledge and skills are critical components of 21st-century learning. These qualities are foundational to the multi-dimensional competencies demanded of students in today's school and workplace. This project provides evidence that every problem that involves numbers and statistics can be solved using mathematical solutions. At the end of this project, not only do we have more inside knowledge about Transportation and Logistic but also, how math taught in school helps us to solve every question, every problem not only in examination papers but also in real-life situations. We do hope that people will find this project fun as well as interesting and maybe even change peoples' perspective about math that math is not so bad after all.

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