

General Mathematics

Investigation 4

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Your Task:

This investigation is to be complete independently.

The main purpose of this investigation is to plan your finances based on your constraints and financial standings. In doing this investigation, you will need to:

1. Demonstrate your ability to research and collate information for investment options.
2. Demonstrate your ability to solve Linear Programming problems by finding the optimal solution for a number of investment options.
3. Comprehend strategies to save interest
4. Develop an understanding of investments and loans.
5. Demonstrate satisfactory digital, literacy and communications skills.

Important Dates:

Due date: refer to your teacher

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Reminders:

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- Use Microsoft Word (you can download your free Microsoft Office 365 subscription as students from the University of Adelaide)
- Save your work as you go. Save it to the Cloud (Box/OneDrive, etc.) to avoid losing your work.
- Show all your workings.
- When you are ready to submit your work. Save your file as a PDF first.
- Type all mathematics using maths notation such as Maths Equations or Maths Type.
- Use academic writing (do not use first-person, slang or informal tone or language).
- Type everything in English.
- Use the spell check to check for spelling and grammatical errors.
- Ensure your report is presentable (all sections presented clearly and formatted correctly, consistent use of font style, etc.)
- Include in text references and a reference list (Harvard referencing)
- If you need help, attend TAP (Maths/EAP/English language support).

Part 1: Your Portfolio (40%)

There are many opportunities to make profit from investments, but it is important to conduct your own research and to assess the risks associated with any returns you may attain. For example, savings accounts and property are generally considered safe investments but may yield low returns. Stocks and shares may generate a higher rate of return but are more risky investments. In general, the higher return one expects from an investment, the greater the risk, which means that you may also stand to lose your money. On top of that, your finances become further complicated with the risk of losing purchasing power over time due to inflation, taxation, and fees.

You are an investment fund manager and plan to invest a sum in a savings account and in Cryptocurrency.

Let x represent the amount you invest in your saving account and y represent the amount you invest in Cryptocurrency.

Before you begin investing, you need to start with research and consider the following questions.

1. How much money do you have to invest?
2. Which Bank and savings account do you plan to invest with? Conduct your research on Australian Banks and select an option that suits your needs. You will need to find the name of the investment (personal savings) account, the interest rate, any, fees, terms and conditions and reference (with link) to the website where you attained that information.
3. Which cryptocurrency do you plan to invest in? Conduct your research and select a cryptocurrency, the current rate and date, the number of coins/tokens you plan to purchase, the fees involved, the last month rate of return, and any other important information. Remember to also reference where you attained your information.
4. Consider whether you are an investor who likes to take risk or not but selecting from the following options to describe how you plan to invest:
 - (1) The value of the cryptocurrency must be less than or equal to (select one: 2/3/4) times the value in your savings account.
 - (2) The value of the cryptocurrency must be greater than or equal to (select one: 50/60/70/80/90/100)% the value in your savings.
5. Research the potential returns you will make from your investments. Collate the rate of return from your savings account (from (2)) and last month's rate of return from your cryptocurrency (from (3)).
6. Account for any assumptions and limitations from your research so far.

Your Task:

Collate the information from questions 1 – 6 above and write a complete summary of your research so far. Do not list your answers to each question. You need to start with an introduction to the section and summarise each question in a cohesive report format.

In your report, use linear programming (by following the steps below) to find the amount you should invest in a savings account and in cryptocurrency to optimise your return. Let x represent the amount you invest in your saving account and y represent the amount you invest in Cryptocurrency.

- State the objective (What are you optimising and are you maximising or minimising?)
- Determine your constraints based on the information from question (1) and (4). You should find five constraints.
- Determine the objective function from question (5).
- Construct a detailed feasible region and solve the problem using linear programming techniques. Show all your calculations in typed equations format and caption all required graphs and images.
- Write a conclusion to your investment situation.

Part 2: Your Mortgage (40%)

- You have been able to make some profit from your investments in part 1. One year ago, you purchased a house for \$1000000 and have been paying the minimum monthly repayments amounts at an interest rate of 2.59% p.a. compounded monthly. The loan you acquired was for a term of 30 years. You decide to put your entire returns from part 1 towards your current home loan as a lump sum payment after one year.

Your Task: Assuming that you continue to make your regular minimum monthly repayments, determine how long it will now take you to pay off your loan and the exact amount of interest saved. Show all your calculations and summarise your findings in a report.

- You decide that there must be additional ways to save on more on interest.

Your Task: Determine an additional strategy you can use to save on interest, describe to the reader what the strategy is, how it will save you interest, and any limitations to the strategy. Apply this strategy to your model from (1) (including the lump sum payment, and remembering that one year has already past) and calculate:

- How long it will now take to pay off the loan.
- The exact amount of interest saved with the two strategies applied together.

Part 3: Your Future (20%)

In part 2, you explored how much money you could save from your home loan if you decided to put your investment returns into your mortgage as a lump sum payment. However, you are also considering the option of keeping the returns in a savings account instead of paying off the mortgage.

Your Task: Compare your two options and write a report on which option you should choose: continuing putting your returns in an investment or use the money as a lump sum payment for your mortgage. In your report, start with an introduction to the section and compare both options by researching, referencing, and stating the reasons for each option. Provide calculations to support your argument and detail the limitations for both options. Consider the current economic situation. Finalise your report by writing a conclusion to state which option you will choose.