Financial Maths review *[67 marks]*

In this question, give all answers to two decimal places.

Bryan decides to purchase a new car with a price of €14 000, but cannot afford the full amount. The car dealership offers two options to finance a loan.

Finance option A:

A 6 year loan at a nominal annual interest rate of 14 % **compounded quarterly**. No deposit required and repayments are made each quarter.

1a. Find the repayment made each quarter. *[3 marks]*

1b. Find the total amount paid for the car. *[2 marks]*

1c. Find the interest paid on the loan. *[2 marks]*

Finance option B:

A 6 year loan at a nominal annual interest rate of r % **compounded monthly**.
Terms of the loan require a 10 % deposit and monthly repayments of €250.

1d. Find the amount to be borrowed for this option. *[2 marks]*

1e. Find the annual interest rate, r. *[3 marks]*

1f. State which option Bryan should choose. Justify your answer. *[2 marks]*

1g. Bryan's car depreciates at an annual rate of 25 % per year. *[3 marks]*

Find the value of Bryan's car six years after it is purchased.

Sophia pays $200 into a bank account at the end of each month. The annual interest paid on money in the account is 3.1% which is compounded monthly.

2a. Find the value of her investment after a period of 5 years. *[3 marks]*

The average rate of inflation per year over the 5 years was 2%.

2b. Find an approximation for the real interest rate for the money invested in the account. *[2 marks]*

2c. Hence find the real value of Sophia's investment at the end of 5 years.   *[2 marks]*

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Give your answers to this question correct to two decimal places.

Gen invests $2400 in a savings account that pays interest at a rate of 4% per year, compounded annually. She leaves the money in her account for 10 years, and she does not invest or withdraw any money during this time.

3a. Calculate the value of her savings after 10 years.   *[2 marks]*

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3b. The rate of inflation during this 10 year period is 1.5% per year.   [3 marks]
Calculate the real value of her savings after 10 years.

Yejin plans to retire at age 60. She wants to create an annuity fund, which will pay her a monthly allowance of $4000 during her retirement. She wants to save enough money so that the payments last for 30 years. A financial advisor has told her that she can expect to earn 5% interest on her funds, compounded annually.

4a. Calculate the amount Yejin needs to have saved into her annuity fund, in [3 marks] order to meet her retirement goal.

4b. Yejin has just turned 28 years old. She currently has no retirement   *[3 marks]*
    savings. She wants to save part of her salary each month into her
    annuity fund.

    Calculate the amount Yejin needs to save each month, to meet her retirement
    goal.

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Paul wants to buy a car. He needs to take out a loan for $7000. The car salesman offers him a loan with an interest rate of 8%, compounded annually. Paul considers two options to repay the loan.

Option 1: Pay $200 each month, until the loan is fully repaid

Option 2: Make 24 equal monthly payments.

Use option 1 to calculate

5a. the number of months it will take for Paul to repay the loan.   *[3 marks]*

5b. the total amount that Paul has to pay.   *[2 marks]*

Use option 2 to calculate

5c. the amount Paul pays each month. *[2 marks]*

5d. the total amount that Paul has to pay. *[2 marks]*

Give a reason why Paul might choose

5e. option 1. *[1 mark]*

5f. option 2.   [1 mark]

Sophie is planning to buy a house. She needs to take out a mortgage for $120000. She is considering two possible options.

Option 1: Repay the mortgage over 20 years, at an annual interest rate of 5%, compounded annually.

Option 2: Pay $1000 every month, at an annual interest rate of 6%, compounded annually, until the loan is fully repaid.

6a. Calculate the monthly repayment using option 1.   [2 marks]

6b. Calculate the total amount Sophie would pay, using option 1.   [2 marks]

6c. Calculate the number of months it will take to repay the mortgage using *[3 marks]* option 2.

6d. Calculate the total amount Sophie would pay, using option 2.   *[2 marks]*

Give a reason why Sophie might choose

6e. option 1.   *[1 mark]*

6f. option 2.   *[1 mark]*

Sophie decides to choose option 1. At the end of 10 years, the interest rate is changed to 7%, compounded annually.

6g. Use your answer to part (a)(i) to calculate the amount remaining on her   *[2 marks]* mortgage after the first 10 years.

6h. Hence calculate her monthly repayment for the final 10 years.   *[2 marks]*

Juliana plans to invest money for 10 years in an account paying 3.5% interest, compounded annually. She expects the annual inflation rate to be 2% per year throughout the 10-year period.

Juliana would like her investment to be worth a real value of $\$4000$, compared to current values, at the end of the 10-year period. She is considering two options.

Option 1: Make a one-time investment at the start of the 10-year period.

Option 2: Invest $\$1000$ at the start of the 10-year period and then invest $\$x$ into the account
at the end of each year (including the first and last years).

7a. For option 1, determine the minimum amount Juliana would need to invest. Give your answer to the nearest dollar. *[3 marks]*

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7b. For option 2, find the minimum value of x that Juliana would need to   *[3 marks]*
invest each year. Give your answer to the nearest dollar.