TRINITY COLLEGE

Mathematics Applications Units 3, 4
Test 5 2019

Calculator Assumed
Finance

STUDENT'S NAME _____

DATE: Wednesday 14th August **TIME:** 50 minutes **MARKS**: 49

INSTRUCTIONS:

Standard Items:	Pens, pencils, drawing templates, eraser
Special Items:	Three calculators, notes on one side of a single A4 page (these notes to be handed in with this assessment)

Questions or parts of questions worth more than 2 marks require working to be shown to receive full marks.

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1. (3 marks)

Clifford has a sum of money to invest for a period of time without touching the investment. He is currently deciding between the two options below. Which investment should Clifford choose? Show mathematical justification to support your answer.

Option A: Invest the money in an account earning compound interest at a rate of 5.38% per annum with interest compounding daily

Option B: Invest the money in an account earning compound interest at a rate of 5.5% per annum with interest compounding annually

2. (6 marks)

The Trinity mathematics department initially purchased a photocopier for $3800. After two years, the value of the photocopier had depreciated to $3150.

(a) Assuming flat rate depreciation, calculate the amount the photocopier depreciates each year. [1]

(b) If the photocopier continues to depreciate at the same rate, how many years after being purchased will value of the photocopier be $550? [1]

A sound system was initially purchased by the Trinity music department for $2100. After five years, the value of the system had depreciated to $1040.

(c) Assuming reducing balance depreciation, calculate the annual percentage rate by which the value of this sound system depreciated. Express your answer correct to two decimal places. [2]

(d) If the sound system is written off when the value reaches 15% of its purchase price, what is the effective life of the sound system? [2]

3. (10 marks)

James would like to buy a new house and decides to take out a mortgage for $550 000 at a fixed rate of 5.24% per annum, compounding monthly.

(a) How much interest will James pay in the first month? [2]

James pays $3 150 at the end of each month, after interest has been added.

(b) Write the recursive rule for the value James' mortgage at the end of each month. [2]

(c) What is owing on the mortgage after 12 months? [1]

(d) How much interest has been paid on the loan after 12 months? [2]

(e) How much money would James have saved after 10 years if he had made monthly payments of $3 250 per month instead of $3 150? [3]

4. (8 marks)

Timothy is saving to purchase a new car worth $7 000. He invests $1 500 into an account which will earn interest at a rate of 3.6% per annum compounded monthly. At the end of each month, after the interest has been added, he will make an additional deposit of $200.

The table below shows the progress of the investment for the first four months.

Month	**Value at beginning of month**	**Interest for the month**	**Deposit**	**Value at end of month**
1	1500.00	4.50	200.00	1704.50
2	1704.50	5.11	200.00	1909.61
3	1909.61	5.73	200.00	2115.34
4	2115.34	***A***	200.00	***B***

(a) Determine the value of ***A*** and ***B***. [2]

(b) Write a recursive rule to represent the value of the investment at the end of each month. [2]

(c) Determine the length of time it will take Timothy to save enough to purchase the car. [1]

(d) How much interest has Timothy's investment accrued by the end of one year? [2]

(e) Determine the amount that Timothy would need to deposit each month in order to save the $7 000 in just 18 months. [1]

5. (2 marks)

Laura decides to invest $15 000 into an account that will earn 7.6% interest compounded daily. If she is to withdraw $1000 at the end of each year, how long will it take for her investment to reach a balance of $0? Explain your answer.

6. (7 marks)

Robert sets up his pension fund on 1st July 2018 with a principal of $850 000. The fund guarantees an annual growth rate of 7.5% per annum compounded monthly and he plans to take an annuity of $75 000 each year on 1st July, starting in 2019.

(a) Calculate the balance in the fund after the annuity is withdrawn in July 2022. [2]

The investment fund revised its annual interest rate to 9% compounded monthly on 1st July 2022 guaranteed for the period to July 2027 and Robert continued withdrawing $75 000 as usual.

(b) Calculate the balance in the fund after a withdrawal is made on 1st July 2027. [2]

(c) Calculate to the nearest $100, the maximum amount Robert could withdraw annually, starting in 2022, without decreasing his balance. [2]

(d) What name is given to the type of investment in part (c)? [1]

7. (13 marks)

Daniel takes out a $16 500 loan to purchase a car after paying a $1 300 deposit. The car dealer offered the loan at an introductory interest rate of 1.95% p.a. for the first year and then the rate becomes 3.45% p.a. for the remaining time of the loan. Interest is added monthly and Daniel has calculated he can afford to make monthly repayments of $450.

(a) (i) Express the loan repayment process for the first year as a recursive formula. [2]

(ii) How much does Daniel still owe after one year? [1]

(b) How much does Daniel owe after two years? [3]

(c) How long does it take Daniel to repay the loan? [2]

(d) Determine the amount of the final repayment. [2]

(e) Calculate the total cost of the car. [3]