Note: The explanation of the data below is considered to be a guide only and student answers may vary. The student's observations about the data should be concise and relevant to interpretation.

PART A (60 marks)

Marks:

1. (a) ASSUMPTION: The mortgage rate that will be used in this analysis is $j_2 = 4\%$.

	Press	**Display**
	4 ■ NOM%	4
	2 ■ P/YR	2
	■ EFF%	4.04
	12 ■ P/YR	12
1	■ NOM%	3.967068
	600000 PV	600,000
	300 N	300
	0 FV	0
1	PMT	-3,156.121232
1	3157 +/- PMT	-3,157

The required monthly payment on the loan is $3,157.

1 (b)

(calculation continued)

Press	**Display**
12 INPUT ■ AMORT	PER 12-12
= = =	585,659.530755

OSB_{12} = $585,659.53

(c) To determine the amount outstanding on September 1, first calculate the amount that would be owing assuming no payments were made in the loan term. Second, calculate the future value of all payments that were made, and then subtract these from the value above.

Amount outstanding assuming no payments are made

(calculation continued)

Press	**Display**	
0 PMT	0	
12 N	12	
FV	-624,240	1

FV = $624,240

Marks:

Future value of payments made by borrower

(i) First 6 payments made on time

Future value of these payments at March 1:

(calculation continued)

Press	**Display**
0 PV	0
3157 +/- PMT	-3,157
6 N	6
FV	19,099.242201

.5 FV = $19,099.24

Future value of these payments at September 1:

(calculation continued)

Press	**Display**
19099.24 PV	19,099.24
0 PMT	0
6 N	6
FV	-19,481.2248

.5 FV = $19,481.22

(ii) April payment made late

Present value of this payment at April 1:

Press	**Display**
4 ■ NOM%	4
2 ■ P/YR	2
■ EFF%	4.04
365 ■ P/YR	365
■ NOM%	3.96074
3157 FV	3,157
14 N	14
0 PMT	0
PV	-3,152.207824

1 PV = $3,152.21

Marks:

Future value of this payment September 1:

Press	**Display**
3152.21 PV	3,152.21
4 ■ NOM%	4
2 ■ P/YR	2
■ EFF%	4.04
12 ■ P/YR	12
■ NOM%	3.967068
0 PMT	0
5 N	5
FV	-3,204.659946

1 FV = $3,204.66

(iii) Only ¾ of May payment made

.5 $0.75 \times \$3{,}157 = \$2{,}367.75$

Future value of this payment at September 1:

(calculation continued)

Press	**Display**
2367.75 PV	2,367.75
0 PMT	0
4 N	4
FV	-2,399.215691

1 FV = $2,399.22

(iv) Only ½ of June payment made

.5 $0.5 \times \$3{,}157 = \$1{,}578.50$

Future value of this payment at September 1:

(calculation continued)

Press	**Display**
1578.50 PV	1,578.5
0 PMT	0
3 N	3
FV	-1,594.206855

1 FV = $1,594.21

Marks:

(v) Only ½ of July payment made
Future value of this payment at September 1:

(calculation continued)

Press	**Display**
2 N	2
FV	-1,588.953947

1 FV = $1,588.95

(vi) August and September payments not made: no debt reduction, no effect on future value.

Total amount outstanding September 1

Total amount outstanding if no payments were made in term: $624,240

Future value of payments made = $19,481.22 + $3,204.66 + $2,399.22 + $1,594.21 + $1,588.95
Future value of payments made = $28,268.26

2 Total amount outstanding September 1 = $624,240 - $28,268.06 = $595,971.74

2. ASSUMPTION: 4-year term fixed rate mortgage rate is $j_2 = 5\%$.

(a)

Press	Display
5 ■ NOM%	5
2 ■ P/YR	2
■ EFF%	5.0625
12 ■ P/YR	12
1 ■ NOM%	4.948699
300 N	300
250000 PV	250,000
0 FV	0
PMT	-1,454.012463
1455 +/- PMT	-1,455

2 Minimum required monthly payment: $1,455

(calculation continued)

Press	**Display**
48 INPUT ■ AMORT	PER 48 - 48
= = =	227,543.806366

1 OSB_{48} = $227,543.81

Marks:

(b) (calculation continued)

Press	Display
1555 +/- PMT	-1,555
48 INPUT ■ AMORT	PER 48 - 48
= = =	222,247.798257

1 If payment = \$1,555, OSB_{48} = \$222,247.80

(c) If the payment is \$1,555, then:

(calculation continued)

Press	Display
24 INPUT ■ AMORT	PER 24 - 24
1 = = =	236,808.616931
OSB_{24}	\$236,808.62
- Lump Sum	-2,000
1 = New Present Value	\$234,808.62

(calculation continued)

Press	Display
234808.62 PV	234,808.62
24 N	24
FV	-220,040.175862

1 New OSB_{48} = \$220,040.18

(d) Interest paid over the 4-year term with the monthly payments:

Press	Display
5 ■ NOM%	5
2 ■ P/YR	2
■ EFF%	5.0625
12 ■ P/YR	12
■ NOM%	4.948699
300 N	300
250000 PV	250,000
0 FV	0
PMT	-1,454.012463
1455 +/- PMT	-1,455
1 INPUT 48 ■ AMORT	PER 1 - 48
1 = =	-47,383.806366

Interest paid over the 25-year amortization period with the monthly payments:

(calculation continued)

Press	Display
1 INPUT 300 ■ AMORT	PER 1 - 300
1 = =	-185,916.3954

With accelerated biweekly payments, the payments would be
PMT = \$1,455 ÷ 2 = \$727.50

Marks:

(i)

Press	**Display**
5 ■ NOM%	5
2 ■ P/YR	2
■ EFF%	5.0625
26 ■ P/YR	26
■ NOM%	4.943216
727.5 +/- PMT	-727.5
250000 PV	250,000
0 FV	0
N	557.760532

Interest paid over the 4-year term with the accelerated biweekly payments:

(calculation continued)

Press	**Display**
1 INPUT 104 ■ AMORT	PER 1 - 104
= =	-46,689.804717

1

1 Interest savings: $47,383.81 - $46,689.80 = $694.01

Using accelerated biweekly payments, Katie will be spending $694.01 less in interest over the 4-year term.

(ii) Interest paid over the 25-year amortization period with the accelerated biweekly payments:

(calculation continued)

Press	**Display**
1 INPUT 558 ■ AMORT	PER 1 - 558
= =	-155,770.912639

2

1 Interest savings: $185,916.40 - $155,770.91 = $30,145.49

Using accelerating biweekly payments, Katie will be saving $30,145.49 in interest over the full amortization period.

1 Katie will be able to pay off the loan in approximately 21.5 years (557.760532 ÷ 26) because she is making one extra monthly payment per year, and is paying down the principal faster as well as paying considerably less interest.

Marks:

1 3. ASSUMPTION: The rate for a 3-year term mortgage is $j_2 = 4.5\%$.

Calculate the payment and outstanding balance for Year 1:

	Press	**Display**
	4.5 ■ NOM%	4.5
	2 ■ P/YR	2
	■ EFF%	4.550625
	12 ■ P/YR	12
1	■ NOM%	4.458383
	200000 PV	200,000
	240 N	240
	0 FV	0
	PMT	-1,260.810311
1	1261 +/- PMT	-1,261
	12 INPUT ■ AMORT	PER 12 - 12
1	= = =	193,656.177216

Calculate payment and outstanding balance for Year 2:

	Press	**Display**
	5 ■ NOM%	5
	2 ■ P/YR	2
	■ EFF%	5.0625
	12 ■ P/YR	12
1	■ NOM%	4.948699
1	193656.18 PV	193,656.18
	1261 +/- PMT	-1,261
	0 FV	0
1	N	243.78392

1 The amortization period cannot exceed 25 years, or 300 months. Since 243.78 months is less than 300 months, this constraint is met.

Continuing to find the outstanding balance:

Press	**Display**
12 INPUT ■ AMORT	PER 12-12
= = =	187,980.045064

Marks:

1 OSB_{24} = $187,980.05

Year 2 payment is $1,261 and amortization is 243.78 months, or approximately 20.3 years.

Calculate payment and outstanding balance for Year 3:

	Press	**Display**
	3.5 ■ NOM%	3
	2 ■ P/YR	2
	■ EFF%	3.530625
	12 ■ P/YR	12
1	■ NOM%	3.474749
	187980.05 PV	187,980.05
	1261 +/- PMT	-1,261
	0 FV	0
1	N	195.414848
	12 INPUT ■ AMORT	PER 12-12
	= = =	179,241.588149

1 OSB_{36} = $179,248.46

The payment is year 3 is $1,261, and the amortization is 195.414848 months, or approximately 16.3 years.

Answers:

	Payment	Exact Amortization	OSB(N)
Year 2	$1,261	243.78392	$187,980.05
Year 3	$1,261	195.414848	$179,241.59

Note: If students obtained an answer for year 2 that produced an N greater than 300, then they would have needed to recalculate a payment. In turn, for year 3, either the payment from year 1 or the new payment obtained in year 2 may be used to calculate the answer.

4. ASSUMPTION: A 15-year term mortgage set 8 years ago would have a rate of approximately j_2 = 7%.

Existing Mortgage Terms

	Press	**Display**
	7 ■ NOM%	7
	2 ■ P/YR	2
	■ EFF%	7.1225
	1 ■ P/YR	1
.5	■ NOM%	7.1225
	800000 PV	800,000
	15 N	15
	0 FV	0
	PMT	-88,516.527857
.5	88516.53 +/- PMT	-88,516.53
	8 INPUT ■ AMORT	PER 8-8
	= = =	475,010.561397

.5 OSB_{96} = $475,010.56

Marks:

Loan-to-Value Constraint

Maximum Total Financing
= Lending Value × Loan-to-Value Ratio
= $1,100,000 × 70%
.5 = $770,000

Maximum Additional Financing:
= Maximum Total Financing - OSB$_{96}$ Existing First Mortgage
= $770,000 - $475,010.56
.5 = $294,989.44

Income Constraint

Net Operating Income (NOI):

Gross Rental Income	
(20 × $1,200 × 12)	$288,000.00
+ Additional Revenue	+20,000.00
=Gross Potential Revenue	$308,000.00
- Vacancy Allowance (2%)	- 6,160.00
= Effective Gross Revenue	$301,840.00
- Operating Expenses (41%)	- 123,754.40
2 = Net Operating Income	$178,085.60

1 Debt Coverage Ratio
Annual Debt Service = Net Operating Income ÷ Debt Coverage Ratio
= $178,085.60 ÷ 1.3
= $136,988.92

Maximum payment for the second mortgage:
.5 $136,988.92 - $88,516.53 = $48,472.39

	Press	**Display**
	14 ■ NOM%	14
	2 ■ P/YR	2
	■ EFF%	14.49
	1 ■ P/YR	1
	■ NOM%	14.49
	7 N	7
	0 FV	0
	48472.39 +/- PMT	-48,472.39
1	PV	204,789.243925

	Maximum loan under LTV	$294,989.99
1	Maximum loan under DCR	$204,789.24

1 DCR is the binding constraint; the maximum loan will be $204,789.24. The total amount of financing to the property owner is $679,799.80 ($204,789.24 + $475,010.56).

Marks:

5. ASSUMPTION: The rate to be used is $j_2 = 6\%$.

Compute payment and OSB at end of term:

	Press	**Display**
1	4000000 - 1000000 =	3,000,000
	PV	3,000,000
	6 ■ NOM%	6
	2 ■ P/YR	2
	■ EFF%	6.09
1	4 ■ P/YR	4
	■ NOM%	5.955663
	80 N	80
	0 FV	0
1	PMT	-64,414.031537
	64415 +/- PMT	-64,415
	20 INPUT ■ AMORT	PER 20-20
1	= = =	2,543,862.73146

Calculation of Shared NOI per quarter:

1 $\$200{,}000 \times 0.05 \times 0.25 = \$2{,}500$

Calculation of Shared Appreciation:

	$\$3{,}750{,}000 \times (1.025)^5$	=	\$4,242,780.80
	\$4,242,780.80 - \$3,750,000	=	\$492,780.80
2	$\$492{,}780.80 \times 0.01$	=	\$4,927.81

Compute Yield to Lender:

	Press	**Display**
	20 N	20
	2500 + 64415 =	66,915
	+/- PMT	-66,915
	4927.81 + 2543862.73 =	2,548,790.54
	+/- FV	-2,548,790.54
	3000000 PV	3,000,000
	4 ■ P/YR	4
1	I/YR	6.342122
1	■ EFF%	6.494558

The effective annual yield to the lender is 6.494558%.

Marks:

PART B – Student must complete EITHER Question 1 or 2 (40 marks)

1. (Note: This answer should be 3-5 pages in length, plus 2 attachments.)

2 (a) Family income: last five digits of student # plus adjustments as necessary
Cash reserves: Family income ÷ 2

2 (b) Attachment of a house or condo form *www.realtor.ca* must be included.

2 (c) Attachment of *www.canadamortgage.com* must be included, showing a chosen term, amortization, and down payment amount.

8 (d) Answers should include the following:
- The mortgage monthly payment increases as the amortization period decreases, and decreases as the amortization period increases.
- The initial mortgage monthly payment does not change with the term chosen using the online calculator for the canadamortgage.com website, but we know that the term affects the payment that will be determined after the term is expired, when refinancing.
- Student must indicate the % of gross monthly income allocated to mortgage payments.
- Student must indicate the % of after-tax income allocated to mortgage payments.
- Students must argue whether they believe that these percentages are or are not affordable.

10 (e) Answers should include the following:
- Student must indicate the % of the down payment relative to the purchase price of the home they selected.
- Student must defend the % they selected, and explain why they did not decide to go higher or lower than this amount.
- Student must mention the difference between the % of down payment that a purchaser would prefer versus the one a residential mortgage underwriter would prefer. The answer should include the fact that a purchaser would wish to make a smaller down payment so they could have the most expensive house they can qualify for, whereas the underwriter would likely prefer to have a more conservative down payment to reduce the risk of default.

4 (f) Answers should include the following:
- Student must indicate whether or not they required mortgage insurance and, if so, the total cost.
- If mortgage insurance was required, the student must indicate whether they paid for it in cash or added it to their mortgage amount, and why.

4 (g) Calculation of available cash - $450 legal fees - ½ property tax. Student must include analysis of approximate maximum price of a home they can purchase, considering the amount of cash they realize they have left over.

Marks:

8 (h) Student must list and explain four factors, other than household income, that will influence the size of the loan that is available to them. Answers may include:

- Credit report
- Size of down payment
- Educational background
- Business experience
- Length of time at current residence
- Current employment situation
- Ability to save money and accumulate assets
- Lending constraints

2. Students are to provide a term paper of approximately 1,000 words, which focuses on some aspect of commercial finance, commercial underwriting, development financing, or leasehold financing. Marks are awarded on the basis of:

8 • writing ability (grammar, spelling, punctuation, etc.)
8 • quality and presentation of the paper, which should:
8 - demonstrate critical thinking
8 - thoroughly explain the main points of the essay
8 - show in depth analysis of the topic chosen

100 Total Marks