READ INSTRUCTIONS TO AVOID PENALTY

COMM308/1 Section AB *Professor J. Maninadiar*

MIDTERM (worth 30%) ***May 28th, 2013***

SOLN

ANSWER ALL QUESTIONS

INSTRUCTIONS

① ***Write FULL NAME and ID# (before STARTING EXAM)***

② ***No Cheating or Talking or Sharing of Calculators Permitted***
2 non-programmable calculators permitted

③ ***Solutions without details or steps will <u>not</u> receive <u>part marks</u>***

④ ***UNTIDY WORK will be <u>penalized</u> (use pencil or pen)***

⑤ ***<u>Use BACK OF PREVIOUS PAGE, if you need more space</u>***

⑥ ***You must return this exam intact (DO NOT REMOVE STAPLE)***

⑦ ***<u>Do not round interest rates (6 decimal places).</u>***

⑧ ***<u>In the event of an error</u>, adjustments will be made during the grading process.***

071

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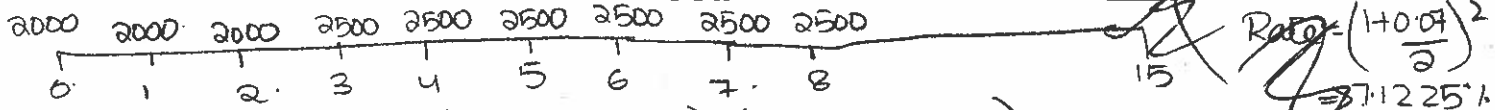
Question #1

YOU have a fixed deposit of $5,000 earning 5.40% per annum that will mature in 7 years.
YOU plan to save $2,000 at the beginning of each year for the first 3 years and $2,500 at the beginning of the next 6 years. Interest rate is 7% per annum compounded semi-annually.
YOUR goal is to accumulate $150,000 at the end of the 15th year.
How much more do YOU need to reach your goal?

Your Final Answer here: 92689



$\text{Rate} = \left(1+\frac{0.07}{2}\right)^2 \Rightarrow 7.1225\%$

FV of 2000 $\Rightarrow$ $2000\,(FVAF_{3,7.1225\%})\,(FV_{13,7.1225\%}) \Rightarrow 15745.848$

FV of 2500 $\Rightarrow$ $2500\,(FVAF_{6,7.1225\%})\,(FV_{7,7.1225}) \Rightarrow 29036.99671$

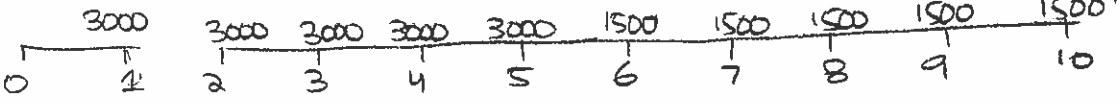
FV of 5000 $\Rightarrow$ $5000\,(1.054)^7(1.071225)^8 \Rightarrow 12528.52$

Total $\Rightarrow$ 57311.365

$150{,}000 - 57311.365 \Rightarrow 92{,}688.63$

Question #2

YOU expect at the end of each year $3,000 for the first 5 years, followed by $1,500 for the next 5 years. Interest rate is 4% per annum compounded monthly.
YOU also have a fixed deposit of $10,000 earning 5% per annum compounded quarterly that will mature in 8 years.
What is the value of these cash flows today? **Your Final Answer here:** 29597



$\text{Rate} = \left(1+\frac{0.04}{12}\right)^{12} \Rightarrow 4.074154\%$

PV of 3000 annuity $= 3000\,(PVAF_{5,4.074154\%}) \Rightarrow 13{,}327.69$

PV of 1500 annuity $= 1500\,(PVAF_{5,4.074154\%})(PV_{5,4.074154}) \Rightarrow 5457.71$

PV of 10,000 $= 10{,}000\,(FV_{8,5.094534\%})(PV_{8,4.074154}) \Rightarrow 10811.798$

for this rate $= \left(1+\frac{0.05}{4}\right)^4 \Rightarrow 5.094534\%$

Total PV = 29597.198

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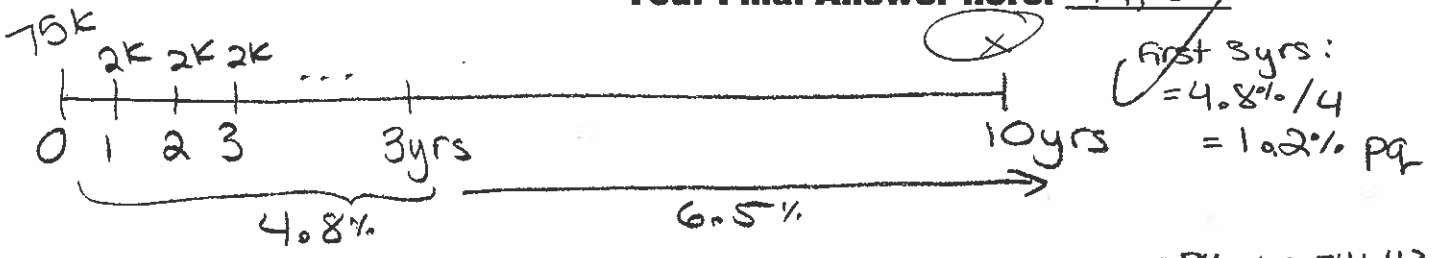
Question #3

YOU negotiated a bank loan and agreed to pay $2,000 at the end of each quarter for the first 3 years AND a lump sum (single amount) at the end of the 10th year. Interest rate is 4.80% per annum for the first three years and 6.50% per annum thereafter.

How much must YOU pay at the end of the 10th year if YOU borrowed $75,000?.

Your Final Answer here: 94,391.36 $



PMT=2000
N=12
I/y=1.2
FV=0
PV=22,228.29

∴ 75,000 − 22,228.29
=52,771.71

PV=52,771.71
N=3
I/y=4.8
PMT=0
FV=60,741.43

PV=60,741.43
N=7
I/y=6.5
PMT=0
FV=94,391.36$

3x4

Question #4

Using the information in Question #3 above, how much do YOU owe the bank at the end of the 2nd year? **Your Final Answer here:** 65,821.40 $

Use the table below if you find it helpful (you do not have to complete this table)

Period	Installment	Interest	Principle	L. Balance
0	—	—	—	75,000
1	2000	900	1,100	73,900
2	2000	886.8	1,113.2	72,786.8
3	2000	873.44	1,126.56	71,660.24
4 (Year 1)	2000	859.92	1,140.08	70,520.16
5	2000	846.24	1,153.76	69,366.4
6	2000	832.4	1,167.6	68,198.8
7	2000	818.39	1,181.61	67,017.19
8 (Year 2)	2000	804.21	1,195.79	65,821.4

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Question #5

YOUR father plans to send YOU to his alma mater (university) 18 years from today. Tuition fees for the three year program are $12,000; $14,000 and $16,000 per annum payable in the beginning of each year. Interest rate is 8% per annum compounded semi-annually.

YOUR father has $5,000 in his bank account (today) for this purpose.

How much should YOUR father save at the beginning of each year for the next 18 years?

Your Final Answer here: 439.96

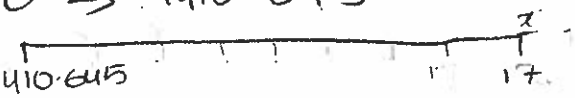
$\text{Rate} = \left(1+\frac{0.08}{2}\right)^2 \Rightarrow 8.16\%$

PV of tution fees $= \frac{12000}{(1.0816)^{18}} + \frac{14000}{(1.0816)^{19}} + \frac{16000}{(1.0816)^{20}}$

$\Rightarrow 9410.645407\$$

money needed in PV $= 9410.645 - 5000 \Rightarrow 4410.645$

$PV = 4410.645$



$4410.645 = PMT\left(\frac{1-\frac{1}{(1.0816)^{17}}}{0.0816}\right) + PMT \Rightarrow 4410 = 10.0250969\,PMT$

$\therefore PMT = 439.96\$$

Question #6

Today, YOUR mother obtained a $80,000 loan from the HSBC Bank. The loan agreement requires YOUR mother to pay $1,250 at the end of each month for 10 years. ***What is YOUR mother's NOMINAL RATE and EFFECTIVE RATE?.***

Your Final Answer here: NOM= 14.163333 **%; EFF** 15.119901 **%**

$PV = 80{,}000 \quad PMT = 1250 \quad n = 120 \quad FV = 0$

$I/Y = 1.180278$ per month

$I/Y \times 12 = /\text{year} \therefore$ Nominal/year $\Rightarrow 14.163333$

Effective $= 15.119901$

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Question #7

YOU are interested in purchasing shares of RSS Contacts Inc. The last dividend paid was $2,00 per share. The company believes the growth rates during this difficult global times to be as follows: Year 1 = 6%; Year 2 = 4%; Year 3 = 2% ; and Year 4 and thereafter = 0 percent.

How much will you be willing to pay for RSS share if you expect a 12% return?.

Your Final Answer here: 18.59

$D_0 = 2\$$ $D_1 = 2.12$ $D_2 = 2.2048$ 2.248896 2.248896

0 — 1 — 2 — 3 — 4

$$P_3 = \frac{D_4}{r-g} = \frac{2.248896}{0.12} \Rightarrow 18.7408$$

$$\text{PV of all future payments} = \frac{2.12}{1.12} + \frac{2.2048}{1.12^2} + \frac{18.7408 + 2.248896}{1.12^3}$$

$$= 18.59056$$

Question #8

RSS Technologies Inc. recently paid dividends of $3.00 per share and is expected to pay $3.15 per share next year. Investors expect a 15% return.

What is the expected price of the share 4 years from today (P_4) if the company expects the same growth rate?

Your Final Answers here: 38.29

$D_0 = 3$ $D_1 = 3.15$ $R = 15\%$

growth $\Rightarrow$ $3(1+g) = 3.15$ $\therefore$ $g = 5\%$

$$P_4 = \frac{D_5}{R-g} \Rightarrow \frac{3(1.05)^5}{0.15-0.05} \Rightarrow 38.2884$$

Question #9

A preferred share with a face value of $90 and a coupon rate of 6 percent per annum, payable quarterly. If the market rate is 7 percent per annum, *what is the market value of the preferred share?*. Your Final Answers here: $77.14

① Face value = 90 $r = 6\%pa/4 = 1.5\%pq$.

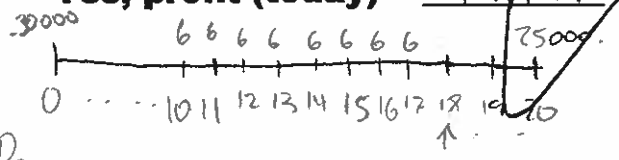
② $PMT = 90 \cdot 1.5\% = 1.35pq$

③ $MV = \frac{1.35pq}{[7/4]\%pq} = 77.14$

Question #10

YOU plan to purchase an insurance policy today for $30,000 which guarantees YOU an annuity of $6,000 at the end of each year for 8 years. The first receipt of this annuity starts beginning of the 11th year. This insurance policy also guarantees YOU $25,000 at the end of the 20th year. If the interest rate is 5%, *will you purchase this insurance policy?*.

Yes, profit (today) = $4419.71 **No, loss (today) = _____**



① $30\,000(FV_{20,5\%}) = 79\,598.93$

② (BGN) $6000(FVA_{8,5\%}) = 60\,159.39$ $(FV_{2,5\%}) = 66\,325.73$

③ $[25\,000 + 66\,325.73] - 79\,598.93 = 11\,726.80$

④ $11\,726.80(FV_{20,5\%}) = 4\,419.71$

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Question #11 **CHOOSE ONE BOND ONLY or you get ZERO**

On January 2nd, 2013 Concordia University issued the following bonds.

Treat each bond independently

Complete the blanks * for BOND A or BOND B or BOND C

	Bond A	Bond B	Bond C
Face Value	$1,000	$1,000	$1,000
Coupon Rate	7.75%	*	6.60%
Paid	Semi-annually	Semi-annually	Semi-annually
Coupon Payment	* $38.75	*	*
Market Rate (NOM) %	* 6.397674%	7.50%	*
Market Value $	* $1129.19	$920	$1,050
Term (years)	15	20	Perpetual
Effective Annual Rate %	6.50%	*	*

BOND A

Coupon payment = $\frac{1000 \times 0.0775}{2} = \frac{77.5}{2} = \$38.75$

Market rate (NOM) → EAR = 6.50

C/Y = 2

NOM = 6.397674%

MV → FV = 1000

PMT = 38.75

N = 15 x 2 = 30

I/Y = $6.397674/_2 = 3.198837$

PV = $1129.19

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	Bond A	Bond B	Bond C
Face Value	$1,000	$1,000	$1,000
Coupon Rate	7.75%	* 6.7225%	6.60%
Paid	Semi-annually	Semi-annually	Semi-annually
Coupon Payment	*	* $33.61	*
Market Rate (NOM) %	*	7.50%	*
Market Value $	*	$920	$1,050
Term (years)	15	20	Perpetual
Effective Annual Rate %	6.50%	* 7.640625%	*

Bond B:

FV 1000

PV 920

Y/Y 3.75

N 40

CPT PMT → 33.607243

$$EFF = \left(1 + \frac{0.075}{2}\right)^2 - 1$$

$$= 7.640625\%$$

Use BACK of PREVIOUS PAGE if you need more space

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	Bond A	Bond B	Bond C
Face Value	$1,000	$1,000	$1,000
Coupon Rate	7.75%	*	6.60%
Paid	Semi-annually	Semi-annually	Semi-annually
Coupon Payment	*	*	* 33
Market Rate (NOM) %	*	7.50%	*6.285714%
Market Value $	*	$920	$1,050
Term (years)	15	20	Perpetual
Effective Annual Rate %	6.50%	*	*6.384490%

C: Coupon pmt = $1000 \times 6.60\% \div 2 = 33$

$$\text{Market value} = \frac{\text{pmt}}{\text{mkt rate PP}} \Rightarrow \text{mkt rate PP} = \frac{33}{1050} = 3.142857\%$$

$$\text{market rate (Nom)} = 3.142857\% \times 2 = 6.285714\%$$

$$\text{EFF} = \left(1 + \frac{6.285714\%}{2}\right)^2 - 1 = 6.384490\%$$

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Question #12

The $180,000 portfolio comprises of $45,000 of Stock B and the balance in Stock A.
The correlation coefficient = minus 0.80

STOCK A (0.75)		**STOCK B** (.25)	
Probability	**Return**	**Probability**	**Return**
20%	**(6%)**	**30%**	**8%**
30%	**12%**	**45%**	**10%**
50%	**10%**	**25%**	**14%**

COMPLETE THE TABLE below

	Stock A	***Stock B***	***Portfolio***
Expected Return	* 7.4	* 10.4	* 8.15
Standard Deviation	*6.756	* 2.245	* 4.63%

Stock A SD = $\sqrt{(-6-7.4)^2 \times 0.2 + (12-7.4)^2 \times 0.3 + (10-7.4)^2 \times 0.5}$

$\Rightarrow \sqrt{45.64} \Rightarrow 6.755738$

Stock B SD $\Rightarrow \sqrt{(8-10.4)^2 \times 0.3 + (10-10.4)^2 \times 0.45 + (14-10.4)^2 \times 0.25}$

$\sqrt{5.04} \Rightarrow 2.244994$

SD of Portfolio = $\sqrt{(0.75^2 \times 0.06756^2) + (0.25^2 \times 0.02245^2) - (2 \times 0.25 \times 0.75 \times 0.02245 \times 0.06 \times 0.8)}$

$= 4.630066976\%$

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Special Instructions

You must write your theory answers in the space and lines provided below. Anything outside this space (box) will NOT be read or graded, no exception. So, please be careful. ⇒ Read text and class notes for theory answers ✓

Question #13

Distinguish between "ex-post" and "ex-ante" returns. ***Max. 4 lines***

Question #14

Identify the basic types of financial instruments that are available and explain how they are traded. ***Max. 5 lines***

Question #15

Give a <u>real example</u> situation of an annuity-due (AD) and an ordinary annuity (OA)?. ***Max. 2 lines***

AD

OA

Question #16

List two (2) *forms* of business organizations and describe one (1) advantage and one (1) disadvantage of each. ***Max. 6 lines***

Form 1:_____

Advantage:_____

Disadvantage:_____

Form 2:_____

Advantage:_____

Disadvantage:_____

Question #17

Explain the importance of aligning the interests of management with the interests of shareholders in a corporation. ***Max. 5 lines***

_____

_____

_____

_____

_____

Question #18

Explain what are money markets (MM) and capital markets (CM). ***Max. 4 lines***

MM_____

_____

CM_____

_____

Equation List - Comm 308 - Booth-Cleary Text

5.3	Present Value of FV_n: $PV_0 = \frac{FV_n}{(1+k)^n}$
5.4	Future value of an annuity: $FV_n = \frac{PMT}{k}\left[(1+k)^n - 1\right]$
5.5	Present Value of an annuity: $PV_n = \frac{PMT}{k}\left[1 - \frac{1}{(1+k)^n}\right]$
5.8	Present value of perpetuity: $PV_0 = \frac{PMT}{k}$
5.10	Effective rate with continuous compounding: $k = e^{QR} - 1$
5.11	Effective rate: $k = \left(1 + \frac{QR}{m}\right)^{\frac{m}{f}} - 1$
5A-2	Present value of growing perpetuity: $PV_0 = \frac{PMT_0(1+g)}{k-g} = \frac{PMT_1}{k-g}$
5A-4	Present value of growing annuity: $PV_0 = \frac{PMT_1}{k-g}\left[1 - \left(\frac{1+g}{1+k}\right)^n\right]$
6.3	Current Yield: $CY = \frac{Annual\ Interest}{B}$
6.6	Price of T-Bill given BEY: $P = \frac{F}{\left(1 + k_{BEY} \times \frac{n}{365}\right)}$
7.10	Share price with growth opportunities: $P_0 = \frac{EPS_1}{k_c} + PVGO$
7.11	Growth rate: $g = b * ROE$
8.3	Total return = Income yield + Capital gain (loss) yield $= \frac{CF_1}{P_0} + \frac{P_1 - P_0}{P_0}$
8.5	Geometric average (GM) $= \left[(1+r_1)(1+r_2)(1+r_3)\times\cdots\times(1+r_n)\right]^{1/n} - 1 = \left(\prod_{i=1}^{n}(1+r_i)\right)^{\frac{1}{n}} - 1$
8.6	Expected return: $ER = \sum_{i=1}^{n}(r_i * \text{Prob}_i)$
8.7	Ex-post $\sigma = \sqrt{\frac{\sum_{i=1}^{n}(r_i - \bar{r})^2}{n-1}}$
8.8	Ex-ante $\sigma = \sqrt{\sum_{i=1}^{n}(\text{Prob}_i)(r_i - ER)^2}$
8.9	Expected portfolio return: $ER_p = \sum_{i=1}^{n}(w_i * ER_i)$
8.11	Portfolio standard deviation: $\sigma_P = \sqrt{(w_A)^2(\sigma_A)^2 + (w_B)^2(\sigma_B)^2 + 2(w_A)(w_B)(COV_{A,B})}$
8.12	$COV_{A,B} = \sum_{i=1}^{n}\text{Prob}_i(r_{A,i} - \bar{r_a})(r_{B,i} - \bar{r_b})$