

MASTER

THE UNIVERSITY OF WESTERN ONTARIO

Actuarial Science 1021A

Test 1

February 12th 2018

1 hour

Name (print clearly): _____

STUDENT ID (print clearly): _____

INSTRUCTIONS

1. This is a closed book examination. Write your answers on the space provided. If needed you can write on the backside of the pages.
2. **Written answer questions should be answered in bullet or point form. For calculation questions, please show your work.**
3. This paper includes a total of 7 pages. There are **6 questions worth a total of 55 marks.**
4. **Use the detailed marking breakdown as a rough guideline for time spent on each question and question part.**
5. Calculators are permitted.
6. **Please use a pen** (although you may use pencil for questions requiring calculations)

Question	Your mark
1. 10 marks	
2. 8 marks	
3. 8 marks	
4. 9 marks	
5. 10 marks	
6. 10 marks	
TOTAL MARKS (55)	

GOOD LUCK!

1. (10 marks)

- (a) (2 marks) In developed countries, generally the more income a person has the greater level of economic security they have. With regards to income, what are some key points to consider when assessing if economic security exists.

real income - relative income (standard of living) - real income
certainty of income - certainty of income, continuous income
standard of living - standard of living satisfy wants/needs

- (b) (2 marks) Provide 4 different examples of things or events that can cause economic insecurity.

→ unemployment → old age - loss of savings / other
→ unexpected costs (or unforeseen) - eg. Hydro, (Health), natural disasters
→ Premature death of family head(s) → disability
→ Personal factors - e.g. addictions

- (c) (2 marks) James Silver earned \$40,000 a year, which is well above minimum wage. Does this assure sufficient income? Justify your answer.

- no - depends on expenses / needs, also on cost of living in area / region he lives

- (d) (1 marks) Provide an example of how inflation can cause economic insecurity for the elderly.

if on fixed income - may have enough \$ today to live in comfort but not necessarily in the future (purchasing power and impact of inflation)

- (e) (1 marks) How does economic insecurity due to poor health compare for those living in Canada compare to those living in the United States? Why?

→ this is a bigger issue in the U.S. than in Canada as more people in Canada are covered (by provincial Health Insurance), Canada has universal health care, U.S. does NOT

- (f) (1 mark) List 2 examples of Canadian (can be federal or provincial) social security programs that help address economic insecurity for those that are older (age 65 or more).

- OAS - GIS / SPA old - Income tested programs
- CLIPP
- Provincial Health Plans

- (g) (1 marks) How are Social Assistance programs funded?

General tax revenues (government)

2. (8 marks)

- (a) (2 marks) Two of the principles for Social Security systems are the principle of Diversity and the principle of subsidiarity. Describe each of these 2 principles

Diversity - use several different approaches to prevent/reduce Economic Insecurity (but caution with efficiency - not too many)

Subsidiarity - Govt responsible for things that can't be handled by individuals themselves. Highest govt levels should cover only what lower forms of govt can't

- (b) (6 marks) For each of the following statements indicate whether it applies to Social Insurance (SI) programs, Private Insurance (PI) programs, both programs (B), or neither programs (N).

	Indicate if SI, PI, B or N
Predetermined benefits	B
More vulnerable to inflation	PI
Minimum floor of protection	SI
No contributions/premiums required	N
Means test	N
Fully funded	PI
Pooling	B
Predictable costs	PI
Adequacy emphasis	SI
Benefits are a contractual right	PI
Risk transfer	B
Government monopoly	SI

3. (8 Marks)

Tax Free Savings Accounts (TFSA) and Registered Retirement Savings Plans (RRSP) are two popular options for savings. For each of the following items, *briefly* comment on how TFSAs and RRSPs compare with respect to:

(i) (2 marks) eligibility requirements.

RRSP - earning related (18-71) (resident)

TFSA - residency reqt only (18+)

(ii) (2 marks) tax treatment of contributions, withdrawals, and investment growth.

RRSP - contrs deductible prior
- tax sheltered growth (no withdrawals)
- all withdrawals fully taxed (except HBP, LLP)

TFSA - contrs not deductible
- no taxes on growth or withdrawals

(iii) (1 mark) plan or account closing date.

RRSP - end of yr turn 71

TFSA - when you die

(iv) (1 mark) impact on means tested benefits (when money is withdrawn).

RRSP - considered (offset) income in means test

TFSA - not

(v) (1 marks) use of funds to pay for a \$100,000 home (first home purchase).

RRSP - 1st ~~25,000~~ 26,000 withdrawn tax free (must pay back)
rest taxed

TFSA - can use without rest'n

(vi) (1 mark) Carry forward provisions.

RRSP - unlimited (till 71)

TFSA - " (till plan closes)

4. (10 Marks)

- (a) (3 marks) Dean Watkins works for a car manufacturing company and is a member of a Registered Pension Plan (RPP). The credited benefit is \$100 per month of service for the first 15 years and \$125 per month of service thereafter. Dean has been a plan member since he was 30 and he retires the day he turns 65. What is his annual pension amount? Justify whether this pension will or will not assure economic security. What type of RPP is this?

- flat benefit DB plan (back end)
- does not assure ES (not indexed for one)
- Annual Amount = $(100)(12)(15) + (125)(12)(20) = 48,000$

- (b) (5 marks) Using the information below, determine the maximum RRSP contribution amount that Samantha Jones can make this year (2018).

Year	Earned Income	Max. RRSP Limit	Pension Adjustment (PA) Value**	RRSP Contribution Made	Carry forward at end of year (e.o.y)
2015	130,000	24,930	6,000	12,500	3,000
2016	150,000	25,370	7,000	16,000	4,400
2017	160,000	26,010	7,500	20,000 @	3,410
2018		26,230			

** reported on T4 for that calendar year

@ assume no further contributions will be made for 2017 year

earnings → previous yrs.
RRSP → current yrs.

A+B+C-D

$$2016 - (3,000 + [\min(18\% (130,000), 25,370) - 6,000]) - 16,000 = 4,400$$

$$2017 - (4,400 + [\min(18\% (150,000), 26,010) - 7,000]) - 20,000 = 3,410$$

$$2018 - (3,410 + [\min(18\% (160,000), 26,230) - 7,500]) = 3,410 + 18,730 = 22,140$$

max (18% income of previous yr, Max RRSP).

- (c) (2 marks) In 2017 Tim Jones returned to law school. That year he withdrew \$15,000 from his RRSP in order to help pay his education costs. Outline what the tax issues are and how much of the money withdrawn would Tim have to pay back to his RRSP.

LTP - max of 20,000 withdrawn tax free (10,000 limit per year)

- must repay within 10 yr max from a prescribed date
- will be fully taxed on 5,000 (full marks if said must withdraw 10,000 in current yr plus 5,000 the next to avoid taxes)

5. (10 marks)

Gov
E'er
Individual

(a) (1 Marks) What are considered the "three Pillars" of Old Age Financial Security?

- Ind'l Savings
- E'er Plans / Sponsored Benefits
- Government

(b) (1 marks) Registered Pension Plans (RPPs) must comply with Provincial Benefits Standard Legislation and Canada Revenue Agency/Income tax legislation. What is the primary purpose of the provincial benefit standards legislation?

- protect plan members interests

(c) (1 marks). What is the key differentiating characteristic of Registered Defined Benefit Plans versus Registered Defined Contribution Plans?

DB - e'er bears Investment risk
DC - e'er "bears" risk

cr

(d) (2 marks) What are key features of a hybrid Registered Pension Plan?

- has aspects of both DC/DB plans
- operates as DC, funds like a DB
- provides "greater of" benefit e.g. Max (1.5% FASys, ACCT Value)
- tend to be contributory plans

what is this
what?

(e) (2 marks) What type of pension formula is typically found in multi-employer plans? What is a general key distinguishing feature of multi-employer plans when comparing them to single employer plans?

flat benefit DB

- can adjust (multi-employer) plan benefits downward if there is a funding issue.

(f) (1 marks) What is the appeal to an employer in offering a group RRSP as opposed to a Registered Pension Plan (RPP)?

→ less admin. complexity
- shift Inv risk to e'er

(g) (2 marks). Paul's commuted pension value is \$500,000 and it is fully locked in. John is age 60 and he is quitting his job as he has been offered a more senior role at another company. What are John's options for his commuted pension value?

Options:

- leave in plan (of e'er he is leaving)
- transfer (portability) to plan of new e'er if allowed
- transfer to locked in vehicle such as LIF, LIRA, annuity

6. (10 marks)

- (a) (2 marks) A member of Western University's Academic (faculty) Pension plan earned \$120,000 in 2017. They had 10 years of service. In addition the employer contributions, the plan member contributed 5.5% of their salary in 2017. What is the plan member's Pension Adjustment (PA)?

DC plan - PA = employer contrib + member contrib

$$PA = 120,000(.085 + .055) = 120,000(.14)$$

$= 16,800$ 8.5% 8.5%

- (b) (2 marks) How is the OMERS pension plan integrated with the Canada Pension plan?

- contrib - lower % on Income \leq YMPE, higher % Income $>$ YMPE
 - bridge benefits (for those retiring early)

- (c) (3 marks) Jim Wilkinson is a policeman and member of the OMERS pension plan. He retired at age 53 (on his birthday) and is eligible for pension benefits. Here is his salary information:
 What is his pension payment (annual amount)?

	Years	Salary
Age 21-45	25	Ranged between 30,000 and 60,000
Age 46-48	3	\$65,000
Age 49-51	3	\$68,000
Age 52-53	2	\$45,000

33 yrs

OMERS - "best 5 yr avg", 2% per yrs, NRA = 60 for police
 ER - no red'n since 33 yrs ($>$ 30)

$$\text{Benefit} = (.02)(33) \left(\frac{1}{5}(3(68,000)) + 2(65,000) \right) = 44,088$$

$66,800$

- (d) (2 marks) The OAS monthly pension amount is \$586.66. Anita Jones is 65 and she applies for the benefit. She has lived in Canada for the past 30 years. What monthly OAS benefit will she receive?

$\left(\frac{30}{40}\right)(586.66) = 439.995$ not here in 77 (new rules) post 1977.

Benefit = \$440

- (e) (1 marks) In terms of Social Security programs classifications, how would the OAS pension be categorized. Justify your answer.

OAS - universal benefit (debatable)
 (eligible if meet residency reqt)
 no other reqt

⊗ debatable given clawback