

# LIFE INSURANCE ASSIGNMENT N. 3

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## EXERCISE 1

Consider a life insurance contract issued for a life aged 50, with the following characteristics: an amount  $C_1$  is paid at the end of the year of death if the insured live survives beyond age 60 and not beyond age 70 years and an amount  $C_2$  is paid at the end of the year of death if the life insured survives beyond age 70.

- (1) Write down the present value of the benefit.
- (2) Write down a formula for the actuarial value in terms of actuarial value of unit standard contracts (e.g. whole life, term insurance, pure endowment),
- (3) Let  $C_1 = 100000\$$  and  $C_2 = 150000\$$ ,  $i = 5\%$ . Using the Standard Ultimate Life Table available on the webpage of the course, compute the actuarial value of the contract.  
IMPORTANT: In the Standard Ultimate Life Table the notation  $A_{x:\overline{n}|} = A_{x:\overline{n}|}^1 + {}_nE_x$ .  
Moreover, the Standard Ultimate Life Table considers, by default  $i = 5\%$ .

## EXERCISE 2

An insurer issues an endowment insurance contract payable at the earliest of 5 years and the end of the year of death for a life aged  $x = 50$  with sum insured  $C_1 = C_2 = 70000\$$  and constant interest rate 5%.

- (1) Let  $\mu_{x+t} = A + BC^{x+t}$  with  $A = 0.00022$ ,  $B = 2.7 \cdot 10^{-6}$  and  $C = 1.24$ . Compute  ${}_k p_x$  for every integer  $k = 0, \dots, 5$ .
- (2) Compute the actuarial value of the contract.
- (3) Evaluate the payment acceleration for mortality.
- (4) EXTRA (not assessed on Thursday) What would the actuarial value of the contract be if the payment is done at the earliest of 5 years and the time of death?