

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?