NOVA SCHOOL OF SCIENCE & TECHNOLOGY

Group Assignment Life contingencies I
From: 15^{th} October 2023
Deadline: 10^{th} December 2023

Group Assignment on Life Contingencies I

1 Assignment Description

This assignment can be solved in any of the platforms used in the classes, namely, , , , **R**.

The students, organized in teams with 2 students, should develop a small application allowing them to evaluate the products explained below.

1.1 The insured person, buying a Term Life Insurance, should be able to choose between:

- The term in the interval [5, 25] years,
- a period to pay a leveled premium, between 5 and 10 years.

All insured lives should be between 25 and 65 years old.

1.2 The life actuary should be able to choose between the following technical basis:

- A flat interest rate between $[1\%, 5\%]$,
- The life tables **"TV 73/77"**[1], **"GRF_95"**[2] and **"GRM_95"**[3]
- After the medical mandatory exams are performed, knowing that the selection period is $d = 3$ years, classify the life to be insured as a **Preferred**, **Standard**, or **Aggravated** life,
- The portfolio size; l_0, of lives, aged (x) the insured age with the same amount of capital underwritten.

The actuaries with the cooperation of the medical staff know that for a life:

- **Aggravated**: $q_{[x]} = 1.20q_x$, $q_{[x-1]+1} = 1.1q_x$, $q_{[x-2]+2} = 1.05q_x$
- **Preferred:** $q_{[x]} = 0.8q_x$, $q_{[x-1]+1} = 0.9q_x$, $q_{[x-2]+2} = 0.95q_x$

1.3 The output should consider:

- The risk single premium,
- The leveled premiums showing the annuity used to level the single premium,
- The expected fund path for the portfolio with initial size l_0, considering premiums received and claims paid, from inception to the last expected claim, considering the table age limit: ω,
- Graphs with premiums received, claims paid, and the population sizes through time,
- A short report comprising elements to be presented to the insured person so she/he can take a decision.

[1] https://mort.soa.org/ViewTable.aspx?&TableIdentity=32006
[2] https://mort.soa.org/ViewTable.aspx?&TableIdentity=34059
[3] https://mort.soa.org/ViewTable.aspx?&TableIdentity=34060

2 Deliverable

Each group should present the following elements:

- The source code fully commented,
- A report explaining how the code operates, with examples fully explaining how to reproduce the results shown. The report should encompass a set of examples showing the program functionalities and should list strong points and weaknesses of the program developed,
- A short film explaining how to operate the program fully presenting how to reproduce at least one of the examples presented in the report.

3 Grades

The grades will be split according to:

- The source code fully commented (10%),
- A short report explaining the concepts used and how the code operates (20%),
- A short film explaining how to operate the program (10%),
- The correctness of the estimates (30%),
- Discussion (30%).