

MTH5126 - Statistics for Insurance

Academic Year: 2022-23

Semester: B

Worksheet 8

Q1. Ruin Theory

An insurer considers that claims of a certain type occur in accordance with a compound Poisson process.

The claim frequency for the whole portfolio is 100 per annum and individual claims have an exponential distribution with a mean of £8,000.

1. Calculate the adjustment coefficient if the total premium rate for the portfolio is £1,000,000 per annum.
2. Estimate the insurer's probability of ultimate ruin assuming that the initial surplus is £20,000 and future premiums remain level.

Q2. Ruin Theory

Claim events on a portfolio of insurance policies follow a Poisson process with parameter λ . Individual claim amounts follow a distribution X with density

$$f(x) = 0.01^2 x e^{-0.01x}, \quad x > 0.$$

The insurance company calculates premiums using a premium loading of 45%.

1. Derive the moment generating function $M_X(t)$.
2. Determine the adjustment coefficient.
3. Find the surplus required to ensure the probability of ultimate ruin is less than 1%.

Further practice:

As usual, after each lecture and seminar, check that you can now do the lecture examples/questions and seminar questions without looking at the answers.