
UNIVERSITY OF TEXAS AT AUSTIN

Quiz #4

Poisson-gamma mixture.

Please, provide your complete solutions to the following questions:

Problem 4.1. (5 points) Let us denote the claim count r.v. by N . We are given that N is a mixture random variable such that

$$N \mid \Lambda = \lambda \sim \text{Poisson}(\lambda)$$

while Λ is Gamma distributed with mean 4 and variance 8. Calculate $F_N(1)$.

Problem 4.2. (5 points) Let the random variable N be in the $(a, b, 0)$ class with $a = 0$ and $b = 8$. Find $\mathbb{P}[N = 10]$.

Problem 4.3. (5 points) Let the number of floods in a calendar year be denoted by N and modeled using the Poisson distribution with mean 5. We say that a flood is “minor” if the damages associated with it do not exceed \$1,000,000. Otherwise, a flood is designated as “major”. The number of floods and the damages caused by individual floods are assumed to be independent.

Assume that the probability that an observed flood is “major” equals $1/5$.

Find the probability that the number of “major” floods is 2, given that the **total** number of floods in that year equals 5.