

# EXAM C QUESTIONS OF THE WEEK

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## Week of October 15/07

In a portfolio of risks, each risk has an exponential claim amount distribution. The mean of the claim amount distribution for a randomly chosen risk is  $\lambda$ , where  $\lambda$  has a Gamma distribution with parameters  $\alpha = 1.5$  and  $\theta = 1$ . A single claim amount of 2 is observed for a randomly chosen risk. Find the Buhlmann credibility premium for the next claim amount for the same risk.

**The solution can be found below.**

## Week of October 15/07 - Solution

Hypothetical mean =  $\mu(\lambda) = E[X|\lambda] = \lambda$ , Process variance =  $v(\lambda) = Var[X|\lambda] = \lambda^2$ .

$$\mu = EHM = E[\mu(\lambda)] = E[\lambda] = \alpha\theta = 1.5$$

$$v = EPV = E[v(\lambda)] = E[\lambda^2] = \theta^2(\alpha + 1)\alpha = 3.75.$$

$$a = VHM = Var[\mu(\lambda)] = Var[\lambda] = \alpha\theta^2 = 1.5.$$

$$Z = \frac{n}{n + \frac{v}{a}} = \frac{1}{1 + \frac{3.75}{1.5}} = \frac{2}{7} \rightarrow \text{the Buhlmann credibility premium is}$$

$$Z\bar{X} + (1 - Z)\mu = \frac{2}{7} \cdot 2 + (1 - \frac{2}{7})(1.5) = 1.64,$$