King Saud University
College of Sciences
Mathematics Department

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Solution of Quiz 2 April 9, 2020 ACTU 464

Question (**5 marks**)
For aggregate claim S, you are given:

$$f_S(x) = \sum_{n=0}^{\infty} f_X^{*n}(x) e^{-50} \frac{(50)^n}{n!}. \tag{1}$$

Losses are distributed as follows: $f_X(1) = 0.4$, $f_X(2) = 0.5$, and $f_X(3) = 0.1$.
Calculate $\mathrm{Var}(S)$.

Solution
From the formula (**??**) we deduce that $\mathrm{P}(N = n) = e^{-50}\frac{(50)^n}{n!}$. That means the distribution of the number of claims or losses is Poisson with parameter 50. $\mathrm{Var}(S) = \mathrm{E}[N]\mathrm{Var}(X) + (\mathrm{E}[X])^2 \mathrm{Var}(N) = \lambda \mathrm{E}[X^2] = 50\,(0.4 + 2^2 \times 0.5 + 3^2 \times 0.1) = \mathbf{165}$.