

STA 2391: RISK THEORY FOR ACTUARIAL SCIENCES
CAT II

DATE: 27th March 2019

TIME: 1 HOUR

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1. An Insurer knows from past experience that the number of claims received per month has a Poisson distribution with mean 15 and the claim amounts have an exponential distribution with mean 500. The insurer uses a security loading of 30%.
- (a) Calculate the insurer's adjustment coefficient. [4 marks]
- (b) Give an upper bound for the insurer's probability of ruin if the insurer sets aside an initial surplus of 500. [2 marks]
- (c) Determine the effect of changing the Poisson parameter λ on the probability of ruin. [3 marks]
2. Find the mgf of a variable $X \sim N(0, 1)$. [5 marks]
3. A compound negative binomial distribution $r = 12$, $p = 0.6$, and $Pr(X = 1, 2, 3) = \{\frac{1}{3}, \frac{1}{3}, \frac{1}{3}\}$. Using Panjer's recursion, find the distribution function of $S = X_1 + X_2 + X_3$. [5 marks]

Consider an insurance portfolio that will produce 0, 1, 2, or 3 claims in a fixed time period with probabilities 0.2, 0.3, 0.1, 0.4 respectively. An individual claim amount of 1, 2, 3 with probabilities 0.1, 0.5, 0.4 respectively. Calculate the cdf of the aggregate claims and hence find the mean and variance of these claims. [11 marks]