ACSC/STAT 3703, Actuarial Models I (Further Probability with Applications to Actuarial Science)
Winter 2015
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Homework Sheet 5
Due: Friday 20th March: 12:30 PM

Basic Questions

1. An insurance company has an insurance policy where the loss amount follows a gamma distribution with $\alpha = 2$ and $\theta = 1000$. Calculate the expected payment per claim if the company introduces a deductible of d.

2. The severity of a loss on a car insurance policy follows a Pareto distribution with $\alpha = 3$ and $\theta = 3000$. Calculate the loss eliminatrion ratio of a deductible of \$1,000.

3. An insurance company has a policy where losses follow a Weibull distribution with $\tau = 0.5$ and $\theta = 6000$. The company's risk management division decides that the TVaR at the 95% level, for this policy needs to be reduced to \$75,000. What policy limit should the company put on the policy to achieve this?

   (i) \$84,400 (ii)\$96,300 (iii) \$122,000 (iv) \$147,000

Standard Questions

4. For a certain insurance policy, losses follow a gamma distribution with $\alpha = 7$ and $\theta = 3,000$. The deductible is set to achieve a loss elimination ratio of 20%.

   (a) Calculate the deductible

   (i) 1500

   (ii) 2700

   (iii) 3300

   (iv) 4200

   (b) Two years later, there has been uniform inflation of 10%, and the company is considering changing the deductible. What is the new loss elimination for the current deductible after this 10% inflation?

5. For a certain insurance policy, losses follow an inverse exponential distribution with $\theta = \frac{1}{2000}$. There is currently a deductible of \$1000, a policy limit of \$500,000, and coinsurance where the insurance pays 80% of the

loss above \$1000 and below \$500,000 (so the maximum total payment is \$399,200).

(a) Calculate the expected payment per loss. [You may use the approximation $e^{-y} \approx 1$ for small values of y.]

(b) The insurance company determines that the following actions will all attract more customers:

(i) removing the deductible.

(ii) increasing the proportion payed by the insurance to 85%

(iii) increasing the policy limit to \$1,000,000.

Which results in the smallest increase to the expected payment per loss?

6. A certain insurance policy has losses following a Burr distribution with $\gamma = 0.6$, $\alpha = 2$ and $\theta = 4000$. There is a deductible of \$2,000, and the number of claims under the policy follows a negative binomial distribution with $r = 8$ and $\beta = 1.3$. What would the distribution of the number of claims be if the company reduces the deductible to \$1,000?