

STAT 479
Test 1
Spring 2016
February 16, 2016

1. Amstutz Assurance Company sells a health insurance policy. The expected number of claims, N , in a given year for each insured follows a zero modified negative binomial distribution with $\beta = 4$ and $\gamma = 2$. Under this zero modified distribution, $p_0^M = 0.4$.

Calculate the $E[N] + \sqrt{\text{Var}[N]}$.

2. During 2015, Catania Casualty Company received 600 claims for automobile accidents. Of these claims, 400 were from male insureds and 200 were from female insureds.

Claims from male insureds follow a Gamma distribution with a $\theta = 200$ and $\alpha = 5$.

Claims from female insureds follow an exponential distribution with a mean of 600.

Assume each claim is independent of other claims.

Assuming the normal distribution, calculate the probability that the total claims in 2015 were less than 530,000.

3. You are given that $S(x) = 1 - \frac{x^2}{10,000}$ for $0 \leq x \leq 100$.

Calculate $TVaR_{0.9}(x)$.

4. The random variable X represents the cost to fix an iPhone which is uniformly distributed between 0 and B . B is distributed as a Pareto distribution with $\alpha = 3$ and $\theta = 400$.

Calculate the $\text{Var}[X]$.

5. The YANG Insurance Company provided earthquake insurance on houses in San Francisco, California. For 2015, the claims were distributed as a Pareto distribution with $\alpha = 3$ and $\theta = 100,000$. In 2015, the earthquake insurance did not have any deductibles, but had an upper limit so that the expected value of the amount paid per loss in 2015 was 80% of the expected value of the loss.

Determine the upper limit.

5. (Continued)

In 2016, YANG expected claims to be subject to uniform inflation of 10%. Additionally, California passed a law that makes upper limits illegal so YANG cannot have an upper limit. Therefore, YANG implements an ordinary deductible of d so that the expected value of the amount paid per loss in 2016 is equal to the expected value of the amount paid per loss in 2015.

Determine the ordinary deductible during 2016.

6. When an insurance company posts a job opening for an actuarial student, the number of candidates who apply follows a Poisson distribution with a mean of 3 per day. Of the candidates that apply, 12% are qualified.

Determine the probability that after a five day period that the Company will have at least two qualified candidates.

7. Michael is an agent for the Fox Insurance Company. He sells disability insurance for Fox. The claims under the disability insurance are distributed as an Exponential distribution with $\theta = 24,000$.

Michael has an agreement with Michael that he will be paid 20% of each claim less than the expected value of each claim. However, Michael has also agree to pay 20% of each claim that exceeds two times the expected value of each claim.

Calculate the expected value of Michael's bonus for each claim.

8. The random variable X represents losses under comprehensive coverage for automobile insurance. Losses are distributed as a two point mixture distribution as follows:

Distribution	Weight
Pareto Distribution with $\alpha = 5$ and $\theta = 1000$	0.6
Pareto Distribution with $\alpha = 3$ and $\theta = 6000$	0.4

Calculate the $Var[X]$.

9. You have the following sample of 5 losses from last year:

100 150 230 400 1000

You treat these losses as an empirical distribution.

Let Y^P be the random variable representing the amount of the payment per payment for an insurance policy with an deductible of 125 and an upper limit of 800. The upper limit is applied before the deductible.

Calculate the $E[Y^P]$.

(Bonus) Calculate the $Var[Y^P]$.