

STAT 479
Spring 2022
Test 1

February 10, 2022

1. (10 points) During 2021, Zhang Dental Company sells a policy with no deductibles and no upper limit. Dental losses follow an exponential distribution with a mean of 75.

During 2022, dental losses are expected to experience uniform inflation of 40%. Zhang decides to implement an ordinary deductible d on its policy so that the expected amount paid in 2022 will be the same as in 2021.

Determine d .

2. (10 points) Losses for an insurance policy covering tornado damage are distributed uniformly between 0 and 10,000.

Cooley Casualty Insurance Company sells a policy to cover these losses. The policy has a franchise deductible of 1000.

Calculate $E[Y^p]$ for this policy.

4. (15 points) You are given that

$$\begin{cases} F(x) = 0, & \text{for } x < 0 \\ F(x) = 0.5\left(\frac{x}{10}\right) + 0.5\left(\frac{x^2}{100}\right), & \text{for } 0 \leq x \leq 10. \\ F(x) = 1, & \text{for } x > 10 \end{cases}$$

a. (5 points) Calculate $E[X]$.

b. (5 points) Calculate $\sqrt{\text{Var}[X]}$.

c. (5 points) Calculate p such that $\pi_p = E[X] + \sqrt{\text{Var}[X]}$.

5. (10 points) The random variable N represents the number of automobile accidents during any 24 hour period in West Lafayette. N is distributed as a Poisson distribution with a mean of 4.

Calculate the probability that the number of accidents in a 24 hour period will be less than the mode of this distribution. (If there are multiple modes, then you should calculate the probability that N will be less than the smallest mode.)

6. (10 points) Hwang Insurance Company sells Hospital Indemnity policies.

For each insured, the number of claims in a year are distributed as a Geometric distribution with a mean of 0.5.

For each claim, the amount of the claim is distributed as a Gamma distribution with $\alpha = 3$ and $\theta = 1200$.

Hwang Insurance Company has 2500 hospital indemnity policies.

Assuming a normal distribution, calculate the probability that total aggregate claims in a year will be less 4,400,000.

7. (10 points) The random variable X is the loss under a medical insurance policy and is distributed as a 2 point mixed distribution. The 2 point mixed distribution is a combination of a gamma distribution with a weight of 0.4 and a Pareto distribution with a weight of 0.6.

The parameters for the gamma distribution are $\alpha = 2$ and $\theta = 100$.

The parameters for the Pareto distribution are $\alpha = 5$ and $\theta = 5000$.

Calculate the standard deviation of X .

8. (10 points) Stowe Indemnity Incorporated provides warranty insurance on iPhones. During each year, the aggregate claims are distributed as follows:

Aggregate Amount of Claim	Probability
0	0.1
50	0.2
100	0.25
200	0.30
400	0.08
1000	0.07

- a. (3 points) Calculate $E[S]$.

Stowe Indemnity purchases stop loss coverage from Schaeffer Stop Loss Company. The stop loss coverage will cover aggregate claims in excess of 250.

- b. (7 points) Calculate the net stop loss premium.

9. (10 points) For a dental insurance policy, the number of dental claims in a year is distributed as follows:

Number of Claims	Probability
0	0.05
1	0.25
2	0.60
3	0.08
4	0.02

The amount of a claim under this policy is distributed as follows:

Amount of Claims	Probability
25	0.25
50	0.50
100	0.15
500	0.05
1000	0.05

Calculate $f_S(100)$, the probability that aggregate claims under a policy will be 100 during a one year period.