University of Texas at Austin

Quiz #5

Please, provide your **complete solutions** to the following questions:

Problem 5.1. (10 points) Aggregate losses S under an insurance policy follow a compound Poisson process with mean equal to 1, and a severity random variable X. The support of the random variable X is $\{10, 20\}$. Moreover, we are given that

$$\mathbb{P}[X = 10] = 3\mathbb{P}[X = 20].$$

The premium for this policy equals 22.

If the insurance company makes a profit, i.e., if the premium exceeds the aggregate losses, it pays a dividend to the policyholder equal to one-third of the profit (the excess of the premium over the aggregate losses). Find the expected dividend.

Problem 5.2. (5 points) In the compound model for aggregate claims, let the frequency random variable N have the Poisson distribution with mean 3. Moreover, let the common distribution of the i.i.d. severity random variables $\{X_j; j = 1, 2, \dots\}$ be the two-parameter Pareto with parameters $\alpha = 3$ and $\theta = 5$. Let our usual assumptions hold, i.e., let N be independent of $\{X_j; j = 1, 2, \dots\}$.
Define the aggregate loss as $S = \sum_{j=1}^{N} X_j$.
How much is $\mathrm{Var}[S]$?