Math 523 Midterm Winter 2000

(1) An insurance company sells stop-loss insurance on a risk X which is exponential with mean 50. The deductible on the insurance is also 50. Suppose the company charges a premium of 30. Find the company's security loading on the policy.

(2) A life-insurance company covers 200 independent lives for 1-year term life insurance as follows:

Benefit amount	Number of policies	Prob. of claim per policy
1	120	0.15
2	80	0.1

The insurance company wants to be 95 percent sure that claims will be less than the premiums it collects.
(a) Find the total premium the company needs to collect. [Use $P(Z < 1.645) = 0.95$ for a standard normal variable.]
(b) Assuming the company has the same security loading for all customers, find the premium for a customer who has a policy with benefit amount 2.

(3) An aggregate claims variable S is compound negative binomial. The severity variable is uniform on the interval $(0, 5)$. The frequency variable has parameters $r = 8$ and $p = 0.4$. Determine $E[S]$ and $\text{var}[S]$.

(4) An aggregate claims variable is compound Poisson with expected number of claims equal to 2. Individual claim amounts can take only the values 1 and 3. For a given claim, the probability the claim ampount is 1 is 0.6. Find the probability that aggregate claims are less than or equal to 4.

(5) There are 3 die, A,B,C, whose faces are labeled either 1 or 2. For dice A, 2 faces are labeled 1 and 4 faces labeled 2. For dice B, 3 faces are labeled 1 and 3 faces labeled 2. Dice C is labeled in the same way as dice B. You select one of the three die A,B,C at random and roll it. The result is a face labeled 2. Now suppose you roll this same dice again. Find the expected value of the result of the second roll.

(6) There are two classes of insureds in a given population. Each insured has either no claims or exactly one claim in one experience period. For each insured, the distribution of the number of claims is binomial. The probability of a claim in one experience period is 0.1 for class I insureds and 0.2 for class II. The population consists of 35% class I insureds and 65% of class II. Suppose a given insured has made 3 claims in the last 8 experience periods. Using Buhlmann credibility theory, estimate the expected number of claims he will make in the next experience period.