Stat 346 Homework #2

1. For a given health insurance policy, the loss amount (expressed in thousands) per year has a pdf of

$$f(y) = cy(5-y), 0 < y < 4$$

where c is a constant.

   (a) Calculate the 99^{th} percentile of the loss amount. (Use software to solve the final polynomial) [3.954]

   (b) Calculate the coefficient of variation of the loss amount. [.4257]

   (c) For a policy with a deductible of \$1000, calculate $E(Y^P)$ and $E(Y^L)$. [\$1500, \$1326]

   (d) For a policy with no deductible but with a limit of \$2500, calculate the expected loss amount. [\$1976.84]

2. For a frequency distribution in the $(a, b, 0)$ class, you are given

   i $p_k = 0.0768$

   ii $p_{k+1} = p_{k+2} = 0.08192$

   iii $p_{k+3} = 0.0786432$

   Determine the mean of this distribution by using E(N)=$\frac{a+b}{1-a}$ [8]

3. Claim frequency follows a distribution in the $(a, b, 0)$ class. You are given that

   i The probability of 4 claims is 0.066116.

   ii The probability of 5 claims is 0.068761.

   iii The probability of 6 claims is 0.068761.

   Calculate the probability of no claims. [.0179]

4. A random variable follows a zero-truncated Poisson distribution with λ=0.8. Calculate the third raw moment of the distribution. [5.869]

5. A random variable X has a c.d.f. of

$$F_X(x) = 1 - e^{-x^2/(2\sigma^2)}, \quad x > 0.$$

   The 90th percentile is 4.29. What is σ?

6. For a certain random variable, X, the TVaR_{95} is 4 and the VaR_{95} is 3. Determine the difference between the expected value of X and the expected value of the limited loss random variable with a cap at $u = 3$.

7. A random variable X has pdf

$$f_X(x) = \frac{8}{(x+2)^3}, \quad x > 0$$

   Determine the TVaR_{99}.

8. Suppose N is a counting distribution satisfying the recursive probabilities:

$$\frac{p_k}{p_{k-1}} = 0.8 + \frac{3.2}{k}$$

   for $k = 1, 2, \ldots$ Identify the distribution of N.

9. Consider the zero-truncated Binomial distribution with probabilities

$$\begin{aligned} p_0 &= 0 \\ p_k &= C\binom{8}{k}0.3^k(0.7)^{8-k}, \quad \text{for} \quad k = 1, ..., 8 \end{aligned}$$

Find the value of C. Derive the mean and the variance of this distribution.