Stat 479
Fall 2009
Quiz 6
October 22, 2009

1. Claims are distributed as an exponential distribution with $\theta = 4000$.

   You want to create a discrete distribution with a span of 1000.

   f_1^R = the probability assigned to the span from 500 to 1500 using the Method of Rounding.

   f_1^{MM} = the probability assigned to the span from 500 to 1500 using the Method of Mean Matching.

   Calculate $10{,}000(f_1^R - f_1^{MM})$.

$$f_1^R = F(1500) - F(500) =$$

$$1 - e^{-\frac{1500}{4000}} - 1 + e^{-\frac{500}{4000}} = .195207624$$

$$f_1^{mm} = \frac{2E[X \wedge 1000] - E[X \wedge 0] - E[X \wedge 2000]}{1000}$$

$$= \frac{2(4000)\left[1 - e^{-\frac{1000}{4000}}\right] - 0 - (4000)\left[1 - e^{-\frac{2000}{4000}}\right]}{1000}$$

$$= 8\left[1 - e^{-1/4}\right] - 4\left[1 - e^{-1/2}\right]$$

$$= .195716374$$

$$10000\left[.195207624 - .195716374\right] = 5.0875$$

2. The number of losses for health insurance is distributed as a Negative Binomial with a mean of 6.

   The amount of each individual loss is follows a Weibull distribution with $\tau = 2$ and $\theta = 500$.

   An insurance policy covering health insurance has an ordinary deductible such that the expected number of claims is 5.

   Calculate the amount of the deductible.

$$E(N^P) = v \cdot E[N^L]$$

$$5 = v \cdot 6 \Rightarrow v = 5/6$$

$$\text{but } v = 1 - F(d)$$

$$\text{so } 5/6 = 1 - \left[1 - e^{-\left(\frac{x}{500}\right)^2}\right] = e^{-\left(\frac{x}{500}\right)^2}$$

$$x = \left(\sqrt{-\ln 5/6}\right)(500) = \underline{\underline{213.5}}$$