Quiz 1

STAT 479

September 2, 2010

1. Dental insurance claims follow a Pareto distribution with a mean of 100 and a variance of 20,000.

   Calculate S(100).

$$E(X) = \frac{\theta}{\alpha - 1} = 100$$

$$Var(X) = E(X^2) - [E(X)]^2 = \frac{2\theta^2}{(\alpha-1)(\alpha-2)} - \left(\frac{\theta}{\alpha-1}\right)^2 =$$

$$\frac{\theta^2 \alpha}{(\alpha-1)^2(\alpha-2)} = 20{,}000$$

$$\frac{Var(X)}{[E(X)]^2} = \frac{\frac{\theta^2\alpha}{(\alpha-1)^2(\alpha-2)}}{\frac{\theta^2}{(\alpha-1)^2}} = \frac{\alpha}{\alpha-2} = \frac{20{,}000}{(100)^2} = 2$$

$$\therefore \quad \alpha = 2\alpha - 4 \Rightarrow \alpha = 4$$

$$\frac{\theta}{4-1} = 100 \Rightarrow \theta = 300$$

$$S(100) = 1 - F(100) = 1 - \left[1 - \left(\frac{\theta}{x+\theta}\right)^{\alpha}\right] =$$

$$\left(\frac{300}{100+300}\right)^4 = 0.3164\underline{0625}$$

2. You are given the following empirical distribution:

50 100 130 200 400 1000

Calculate E[(X∧300)].

X	X∧300
50	50
100	100
130	130
200	200
400	300
1000	300

$$E[(X \wedge 300)] = \frac{1}{6}[50 + 100 + 130 + 200 + 300 + 300]$$

$$= \frac{1080}{6} = 180$$