# STAT 479
# Quiz 1
# Spring 2016
**January 26, 2016**

1. You are given that $X$ is the random variable representing the amount of a claim from an automobile accident. $X$ is distributed as a two parameter Pareto Distribution with mean of 2000 and a variance of 6,000,000

   The Henry Auto Insurance Company issues automobile policies with a deductible of 500. This policy will pay for the amount of any claim in excess of 500. Calculate the expected value of payment per claim incurred. This is the same as $E\left[(X-500)_+\right]$.

   **Solution:**

$$E[X]=2000=\frac{\theta}{\alpha-1};Var[X]=\frac{\theta^2(\alpha)}{(\alpha-1)^2(\alpha-2)}=6,000,000$$

$$==>\frac{\theta^2}{(\alpha-1)^2}\frac{\alpha}{(\alpha-2)}=6,000,000==>(2000)^2\frac{\alpha}{(\alpha-2)}=6,000,000$$

$$==>\alpha=1.5(\alpha-2)==>\alpha=6==>2000=\frac{\theta}{6-1}==>\theta=10,000$$

$$E[X]=E[(X-500)_+]+E[X\wedge 500]$$

$$E[X\wedge 500]=\frac{\theta}{\alpha-1}\left[1-\left(\frac{\theta}{500+\theta}\right)^{\alpha-1}\right]=\frac{10,000}{5}\left[1-\left(\frac{10,000}{10,500}\right)^5\right]=432.95$$

$$E[(X-500)_+]=E[X]-E[X\wedge 500]=2000-432.95=1567.05$$

2. The claim cost per acre for agricultural insurance is represented by the random variable $X$ and is distributed uniformly over the range of 50 to 1050. Calculate $(TVaR)_{0.9}(X)$.

**Solution:**

$$TVaR_{0.9}(x) = \frac{\int_{\pi_{0.9}}^{1050} x \cdot f(x) \cdot dx}{1-0.9}$$

$$\pi_{0.9} = 50 + (0.9)(1050-50) = 950$$

$$TVaR_{0.9}(x) = \frac{\int_{950}^{1050} x \cdot \frac{1}{1000} \cdot dx}{1-0.9} = \frac{\left.\frac{x^2}{2000}\right]_{950}^{1050}}{0.1} = 1000$$

*Or*

$$TVaR_{0.9}(x) = E[X \mid X > 950] = \frac{950+1050}{2} = 1000 \quad \text{Since it is a uniform distribution}$$