

Stat 479  
Fall 2010  
Quiz 9  
November 18, 2010

1. You are given the following random sample from an Exponential distribution:

3 6 8 10 20

Using percentile matching at the 80<sup>th</sup> percentile, estimate  $\theta$ .

$$n = 5 \quad (n+1)g = 6(.8) = 4.8$$

$$x_4 = 10 \quad x_5 = 20$$

$$80\text{th percentile} = (1 - .8)(10) + (.8)(20)$$

$$= 18$$

$$F(18) = 1 - e^{-18/\theta} = .80$$

$$.2 = e^{-18/\theta}$$

$$\ln(.2) = -18/\theta$$

$$\theta = \frac{-18}{\ln(.2)} = 11.18403$$

2. You are given the following random sample from a Pareto distribution:

10 40 200 750

Using the method of moments, estimate  $\alpha$  and  $\theta$ .

$$E(X) = \frac{10 + 40 + 200 + 750}{4} = 250 = \frac{\theta}{\alpha - 1}$$

$$E(X^2) = \frac{10^2 + 40^2 + 200^2 + 750^2}{4} = 151,050 = \frac{2\theta^2}{(\alpha - 1)(\alpha - 2)}$$

$$\frac{E(X^2)}{[E(X)]^2} = \frac{2\theta^2}{(\alpha - 1)(\alpha - 2)} \cdot \frac{(\alpha - 1)^2}{\theta^2} = \frac{2(\alpha - 1)}{\alpha - 2} = \frac{151,050}{(250)^2}$$

$$2\alpha - 2 = 2.4168(\alpha - 2) = 2.4168\alpha - 4.8336$$

$$2.8336 = .4168\alpha$$

$$\alpha = 6.79846$$

$$\frac{\theta}{\alpha - 1} = 250 \Rightarrow \theta = 250(5.79846)$$

$$= 1449.61612$$