

MATH 396 QUIZ II

- 1) Find the maximum likelihood estimate for the pdf

$$p_X(k; \theta) = \frac{\theta^{2k} e^{-\theta^2}}{k!}, \quad k = 0, 1, 2, \dots$$

How can you tell if this is unbiased? *Hint:* Poisson.

- 2) Using the method of moments, derive formulas for estimating the parameters r and p in

$$p_X(k; r, p) = \binom{k-1}{r-1} p^r (1-p)^{k-r} \quad k = r, r+1, \dots$$

Suppose r is given. What does MLE give for p ?

- 3) Suppose a coin is tossed n times for the purpose of estimating $p = P(\text{heads})$. How large must n be in order to guarantee the length of the 90 % confidence interval is less than 0.01?

- 4) Let Y_1, Y_2, \dots, Y_n be a sample from the pdf

$$f_Y(y; \theta) = \frac{1}{\theta} e^{-y/\theta}, \quad y > 0.$$

Let $\hat{\theta} = nY_{\min}$. Is $\hat{\theta}$ unbiased for θ ? Is $\hat{\theta} = \frac{1}{n} \sum_{i=1}^n Y_i$ unbiased?