

Math 483 HW 20 Fall 2023. Due Thursday, Nov. 16.

**One page, problems A)-E).**

Exam 4: Friday, Dec. 1.

Quiz 9 is on Friday, Nov 17: MSE, “easy MLE problem”, Normal approx to the binomial, large and small sample CI’s, sample size needed for CI.

comment for A)-E): To find the methods of moments estimator, find  $E(Y) = h(\theta)$ , then  $\hat{\theta} = h^{-1}(\bar{Y})$ . See examples 9.12 and 9.13. **DO NOT FORGET THE HAT ON YOUR ESTIMATOR:** use  $\hat{\theta}$  as the estimator of  $\theta$ .

A) 9.69 MODIFIED Let  $Y_1, \dots, Y_n$  denote a random sample from a population with pdf

$$f(y|\theta) = \begin{cases} (\theta + 1)y^\theta, & \text{if } 0 < y < 1, \theta > -1 \\ 0, & \text{otherwise.} \end{cases}$$

Find the method of moments estimator of  $\theta$ .

comment: Just find the method of moments estimator.

B) 9.70 Let  $Y_1, \dots, Y_n$  denote a random sample from a Poisson distribution with mean  $\lambda$ . Find the method of moments estimator of  $\lambda$ .

C) 9.74a Let  $Y_1, \dots, Y_n$  denote a random sample from a population with pdf

$$f(y|\theta) = \left(\frac{2}{\theta^2}\right) (\theta - y),$$

if  $0 \leq y \leq \theta$ . Find the method of moments estimator of  $\theta$ .

D) 9.77 Let  $Y_1, \dots, Y_n$  denote a random sample from a uniform  $(0, 3\theta)$  distribution. Find the method of moments estimator of  $\theta$ .

E) 9.78 Let  $Y_1, \dots, Y_n$  be iid with pdf

$$f(y|\alpha) = \alpha y^{\alpha-1} / 3^\alpha$$

if  $0 \leq y \leq 3$ .

i) Show  $E(Y_1) = 3\alpha/(\alpha + 1)$ .

ii) Find the method of moments estimator of  $\alpha$ .

**Note:** the following URL has many MLE examples.  
<http://.parker.ad.siu.edu/Olive/ich10.pdf>