

**TA SESSION # 5**  
**ECON 341: ECONOMETRICS**

J. MARCELO OCHOA

**Problem (7.40).** Let  $\{X_i\}$  be iid Bernoulli( $p$ ). Show that the variance of  $\bar{X}$  attains the Cramer-Rao lower Bound, and hence  $\bar{X}$  is the best unbiased estimator of  $p$ .

**Problem (8.3).** Suppose that we observe  $m$  iid Bernoulli( $\theta$ ) rv,  $\{Y_n\}$ . Show that the LRT of  $H_0 : \theta \leq \theta_0$  vs  $H_1 : \theta > \theta_0$  will reject  $H_0$  if  $\sum_{i=1}^n Y_i > b$ .

**Problem (8.15).** For a random sample  $\{X_n\}$  from  $N(0, \sigma^2)$  population, find the most powerful test of  $H_0 : \sigma = \sigma_0$  vs.  $H_1 : \sigma = \sigma_1$  where  $\sigma_0 < \sigma_1$  for a given size  $\alpha$ .

**Problem (8.18).** Let  $\{X_n\}$  be a random sample from  $N(0, \sigma^2)$  population with  $\sigma^2$  known.

- (a) Find the LRT test of  $H_0 : \theta = \theta_0$  vs  $H_1 : \theta \neq \theta_0$ .
- (b) Find an expression for the power function of the test.
- (c) The experimenter desires a Type I error probability of .05 and a maximum Type II error probability of .25 at  $\theta = \theta_0 + \sigma$ . Find the values of  $n$  and  $c$  that will achieve this.