

## ECON 5350 Problem Set #2

Due: Monday, October 2 by 11:59 pm

1. A common method of simulating random draws from the standard normal distribution is to compute the sum of 12 draws from the *uniform*[0, 1] distribution and subtract 6. Can you justify this procedure?
2. Consider a random sample  $\{X_1, X_2, \dots, X_n\}$  from a *uniform*[\(\theta\_1, \theta\_2\)] distribution.
  - (a) Derive the sampling distribution (pdf) for the 1<sup>st</sup> order statistic,  $Y_1$ .
  - (b) Use MATLAB to create an xy graph of the sampling distributions from part (a) for  $n = 2, 5,$  and 10.
  - (c) Use MATLAB simulations and histograms to verify the shape of the sampling distributions, superimposing the graphs from parts (b) and (c) over one another.
  - (d) Show that  $Y_1$  is a consistent estimator of  $\theta_1$ .
  - (e) Use MATLAB to verify.
3. In random sampling from the exponential distribution

$$f(x) = (1/\theta)\exp[-x/\theta], \quad x, \theta > 0,$$

find the maximum likelihood estimator of  $\theta$  and obtain the asymptotic distribution of this estimator.

Design a MATLAB simulation to verify the asymptotic distribution.

4. Repeat parts #2(a)-(c) using the exponential pdf above.