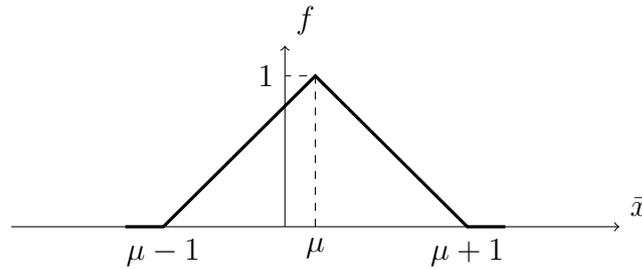


Econ 222-01  
 2013-2014 Spring  
 Homework VI  
 Due Date: April 11, 2014

- 1) Consider a population which is uniformly distributed with a range of 2. The population mean is not known but is believed to be at least 1 ( $H_0 : \mu \geq 1$ ). In order to test the hypothesis that the mean is less than 1 ( $H_1 : \mu < 1$ ) against the hypothesis that the population mean is at least 1, we take a sample of size 2 and use the sample mean as the test statistics. If the population mean is  $\mu$ , then it is known that the distribution of the test statistic is as shown below:



The graph of the density function,  $f$ , of  $\bar{x}$ .

For a significance level of 0.04, find the probability of a Type I error as a function of the population mean?

- 2) The training director of a manufacturing company wanted to compare three different team-based teaching approaches on assembling a product. Each member of a group of 26 new employees was randomly assigned to one of the three team-based method. After completing the training, the employees in the study were evaluated on the time it took (in minutes) to assemble the product. The results are summarized as follows:

Method	<i>A</i>	<i>B</i>	<i>C</i>
Sample size	9	9	8
Sample mean (min.)	8.98	7.94	8.74
Sample standard deviation (min.)	0.40	0.62	0.68

- a. Identify the response variable, factor(s), factor levels, treatments, and experimental units of this experiment.
  - b. For each pair of team-based method, test if the team based method used causes a difference on the mean time (in minutes) of assembling the product (assume that the variances are equal)?
- 3) We would like to test  $H_1 : \mu > 0$  against  $H_0 : \mu \leq 0$  at a significance level of 0.05, using the test statistic  $\bar{X}/(\sigma/\sqrt{n})$ . The population is known to be approximately normally distributed with a standard deviation of 5. We would like the probability of a Type II error to be at most 0.85 when the (true) population mean is 1. What is the smallest sample size needed in order to attain this?