Name: TAYLOR'S VERSION Student ID: _____

ECON 0150 | MiniExam 3 | Demo

This MiniExam will take 8 minutes with a quick break to follow. MiniExams are designed to both test your knowledge and challenge you to apply familiar concepts in new environments. Treat it as if you're trying to show me that you understand the material. Answer clearly, completely, and concisely.

Academic Conduct Code

The following academic conduct code is designed to protect the integrity of your work. Print your name/initials beside the three academic honesty agreements. I pledge to my fellow students, the university, and the instructor, that:

✓ I will complete this MiniExam solely using my own work.
✓ I will not use any digital resources unless explicitly allowed by the instructor.
✓ I will not communicate directly or indirectly with others during the MiniExam.

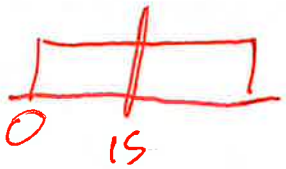
Q1. A restaurant's customer wait times follow a *uniform* distribution with mean (μ) = 15 minutes and standard deviation (σ) = 3 minutes.

a) If you take a sample of $n = 1$ customer wait times, the sampling distribution of the mean ($\bar{x}$) will have:

Shape: Uniform

Mean: 15

Standard error: 3



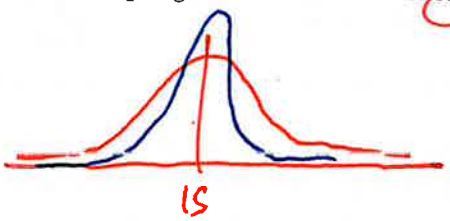
$se = \frac{\sigma}{\sqrt{n}} = \frac{3}{\sqrt{1}} = 3$

b) If you take a sample of $n = 64$ customer wait times, the sampling distribution of the mean ($\bar{x}$) will have:

Shape: Approx. Normal

Mean: 15

Standard error: 3/8



$se = \frac{3}{\sqrt{64}} = \frac{3}{8}$

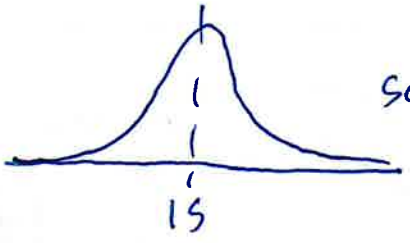
c) If you take a larger sample of $n = 100$ customers instead, what changes?

- ☐ The mean of the sampling distribution
- ☐ The standard error of the sampling distribution
- ☐ Both the mean and standard error
- ☐ Neither the mean nor standard error

$se = \frac{3}{\sqrt{160}} = \frac{3}{10}$

Q2. You run a simulation taking 1000 samples (n=50 each) from a population with μ=15 and σ=3. When you plot the histogram of sample means, you notice:

a) The shape of this histogram will be approximately:



$se = \frac{3}{\sqrt{50}}$

□ The same shape as the original population
□ Exactly normal with a standard deviation = 3
□ Approximately normal with a standard deviation of = 3
□ Approximately normal with a standard deviation of = $3/\sqrt{50}$

b) Due to the Central Limit Theorem, we know that:

□ The population distributions must be normal
□ The samples must be the same size
□ The sample means will approximately follow a normal distribution
□ The sample means will approximately follow a t-distribution

Q3. You take repeated samples of size n=50 from a population and plot the sample means. Which statement best explains what you expect to see?

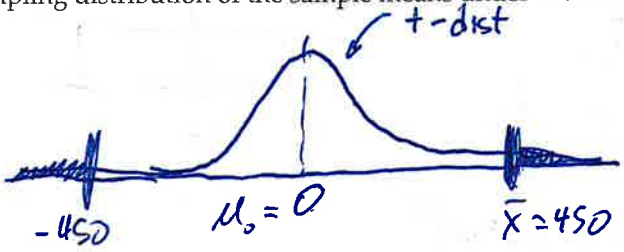
□ The histogram will look exactly like the population distribution
□ The histogram will be normal with the same spread as the population
□ The histogram will be normal with less spread than the population
□ The histogram will be normal only if the population is normal

Briefly explain your choice: #Extreme values are less common than in the population. Normal due to the CLT.

Q4. A researcher is testing whether a job training program impacts earnings. The collected data shows athat increases in earnings after the program have a sample mean of $450 and a standard error of $200.

a) Which of the following correctly describes the sampling distribution of the sample means under the null hypothesis of no effect? $\mu_0 = 0$

□ It follows a normal distribution centered at $450
□ It follows a normal distribution centered at $0
□ It follows a t-distribution centered at $450
□ It follows a t-distribution centered at $0



b) The p-value for this test is 0.028. Which statement most accurately explains what this p-value means?

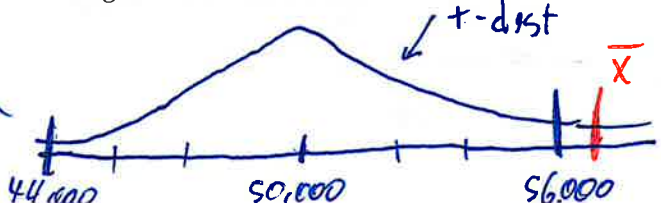
□ There's a 2.8% chance that the job training program has no effect
□ There's a 2.8% chance that the sample mean difference is $450
□ If the job training program truly had no effect, we'd observe a difference of $450 or more extreme 2.8% of the time
□ The probability that our conclusion is wrong is 2.8%

Q5. A researcher is testing a null hypothesis that average incomes in the county are equal to $50,000. The sample mean is $56,500 and the sample standard error is $2000. The researcher has decided in advance to reject the null hypothesis if it lies at least 3 standard errors away from the sample mean.

a) Use figure of the probability density function of the sampling distribution to show the confidence interval the researcher has constructed for this test.

b) Write down the values of the upper and lower bounds of this confidence interval. [44,000, 56000] or $[56{,}500 \pm 6000]$

c) Using this confidence interval, is the researcher able to reject the null hypothesis of an average income of $50,000?



Reject H_0. We are very confident that the average income is not 50k.