Name: TAYLOR'S VERSION Student ID: _____

ECON 0150 | MiniExam 3 | Fall 2025

This MiniExam will take 16 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.

12 pts

NOTE!
For every question, 1pt if incorrect, 0pts if blank.

Q1. A class's average sleep time follows an *exponential* distribution with mean (μ) of 8 hours and standard deviation (σ) of 1.5 hours.

a) If you sample one student ($n = 1$), what is the sampling distribution of the sample mean?

Shape: Exponential 4pts

Mean: 8 3pts

Standard error: 1.5 4pts

b) If you sample 36 students ($n = 36$), what is the sampling distribution of the sample mean?

Shape: Aprox Normal 4pts

Mean: 8 3pts

Standard error: 1.5/6 = 0.25 4pts

c) If you sample one hundred students ($n = 100$), what is the sampling distribution of the sample mean?

Shape: Aprox Normal 4pts

Mean: 8 3pts

Standard error: 1.5/10 = 0.15 4pts

Q2. You take 1000 samples ($n = 64$) of classes, each with sleep times following an *exponential* distribution with mean (μ) of 8 hours and standard deviation (σ) of 1.5 hours (*same as in Q1*).

a) If you were to plot a histogram of the sample means student's sleep times, describe the distribution you would expect to see:

Shape: Approx Normal 4pts

Mean: 8 3pts

Standard error: 1.5/8 = 0.1875 4pts

b) According to the Central Limit Theorem, which statement is correct?

☐ The sample mean will equal the population mean when n is large enough

☐ The individual data points in a sample will follow a normal distribution

☑ The distribution of sample means will approach a normal distribution 6pts

☐ The population distribution must be normal for the theorem to apply

Q3. You are interested in whether students sleep on average 8 hours per night. You take one sample of 100 students ($n = 100$) with an average sleep time ($\bar{x}$) of 7.5 hours and standard deviation (S) of 1. You have decided in advance to reject the null hypothesis if it lies 3 standard errors away from the sample mean.

a) Describe the sampling distribution.

Shape: t 5pts

Mean: 8 or 7.5 3pts

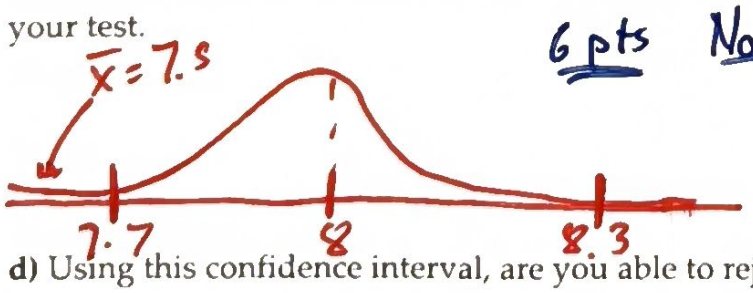
Standard error: 1/10 = 0.1 4pts

Note:
- Two possible answers in Q3b and Q3c.

b) Construct the confidence interval for your test.

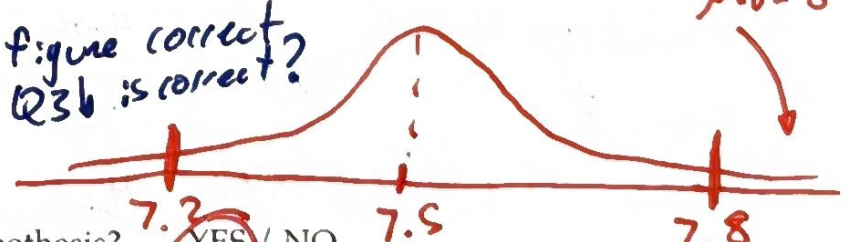
Lower Bound: 7.7 or 7.2 4pts Upper Bound: 8.3 or 7.8 4pts

c) Use a figure of the probability density function of the sampling distribution to show the confidence interval for your test. 6pts



Notes:
- Is the figure correct if Q3b is correct?

OR



d) Using this confidence interval, are you able to reject the null hypothesis? ☑ YES / NO 4pts

Q4. A researcher conducts a test of whether students sleep on average 7.8 hours per night with a p-value of 0.12. Describe in one sentence what this p-value means.

The p-value is the probability of seeing a sample mean as extreme as $\bar{x}$ if the null of 7.8 is true.

2pts
- Did they mention probability (2pts), something about extremeness (2pts), assuming the null hypothesis (4pts).