

Name: _____

Student ID: _____

ECON 0150 | MiniExam 3 | Fall 2025

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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: _____

Mean: _____

Standard error: _____

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

Shape: _____

Mean: _____

Standard error: _____

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

Shape: _____

Mean: _____

Standard error: _____

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: _____

Mean: _____

Standard error: _____

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
- 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: _____

Mean: _____

Standard error: _____

b) Construct the confidence interval for your test.

Lower Bound: _____

Upper Bound: _____

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

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

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.

Name: Ethan Papa

Student ID: A537873

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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

Mean: 8

$$\frac{8}{\sqrt{1}}$$

Standard error: 8

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

Shape: approx. normal

Mean: 8

$$\frac{8}{\sqrt{36}} \quad \frac{8}{6} \quad \frac{4}{3}$$

Standard error: 8/3

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

Shape: approx. normal

Mean: 8

$$\frac{8}{\sqrt{100}} \quad \frac{8}{10}$$

Standard error: 8/10

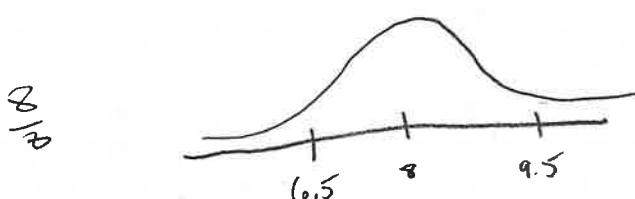
Q2. You take 1000 samples ($n = 64$) of classes, each with sleep times following an *exponential* distribution with mean (μ) of 8 hours and standard deviation (σ) of 1.5 hours (*same as in Q1*).

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: Exponential

Mean: 8

Standard error: 1



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
 The population distribution must be normal for the theorem to apply

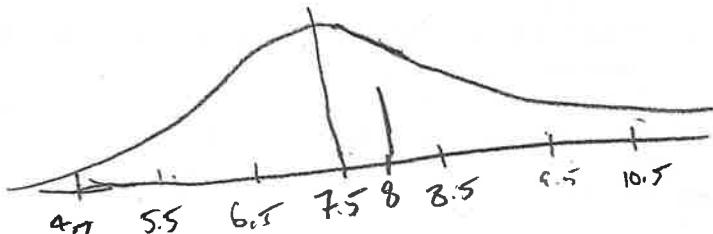
Q3. You are interested in whether students sleep on average 8 hours per night. You take one sample of 100 students ($n = 100$) with an average sleep time (\bar{x}) of 7.5 hours and standard deviation (S) of 1. You have decided in advance to reject the null hypothesis if it lies 3 standard errors away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

a) Describe the sampling distribution.

Shape: Normal

Mean: 7.5

Standard error: .75



b) Construct the confidence interval for your test.

Lower Bound: 4.5

Upper Bound: 10.5

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

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

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.

They are 12% confident that the null hypothesis will not be rejected

Name: Ruby Iskandarani

Student ID: 4806285

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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

Mean: 8

Standard error: 1.5

$$S.E. = \frac{1.5}{\sqrt{1}} = 1.5$$

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

Shape: approx. normal

Mean: 8

Standard error: $\frac{1.5}{6}$ $\frac{1.5}{\sqrt{36}} = \frac{1.5}{6}$

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

Shape: approx. normal

Mean: 8 $\frac{1.5}{\sqrt{100}} = \frac{1.5}{10}$

Standard error: $\frac{1.5}{10}$

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

$$\frac{1.5}{\sqrt{64}} = \frac{1.5}{8}$$

Mean: 8

$$\frac{1.5}{8}$$

Standard error: $\frac{1.5}{8}$

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
- 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.

$$\mu_0 = 8.0$$

$$3 \times 0.1 = 0.3$$

$$\frac{1}{\sqrt{100}} = \frac{1}{10} = 0.1$$

Shape: approx. normal

Mean: 7.5

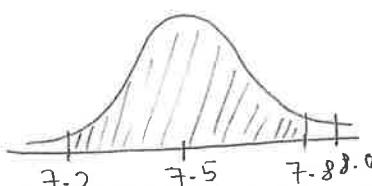
Standard error: 0.1

b) Construct the confidence interval for your test.

Lower Bound: 7.2

Upper Bound: 7.8

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



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

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 probability that a sample we take will be 7.8 hours is 0.12.

Name: Yulin Li

Student ID: 4578696

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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.

Mean: 8

Standard error: 1.5

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

Shape: Approximately Normal

Mean: 8

$$\frac{1.5}{\sqrt{36}} = .$$

Standard error: .15

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

Shape: Approximately Normal

Mean: 8

$$\frac{1.5}{\sqrt{100}} = .$$

Standard error: 0.15

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: Approximately normal.

1.5 / 8

Mean: 8

Standard error: 0.1875

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
- 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: Approximately normal

Mean: 7.5

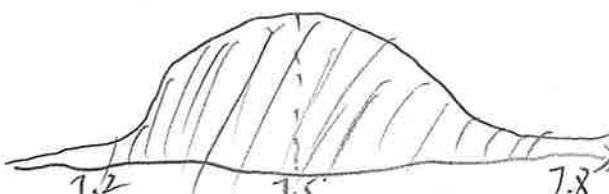
Standard error: 0.1

b) Construct the confidence interval for your test.

Lower Bound: 7.2

Upper Bound: 7.8

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



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

YES / NO

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.

If the true mean were 7.8 hours, we would observe our result at least as extreme as ours about 12% of the time.

Name: Kurt Habazin

Student ID: 3608342

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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

$$SE = \frac{\sigma}{\sqrt{n}} = \frac{1.5}{\sqrt{1}} = 1.5$$

Mean: 8 hrs

Standard error: 1.5 hrs

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

Shape: Approx. Normal

Mean: 8

$$SE = \frac{\sigma}{\sqrt{n}} = \frac{1.5}{\sqrt{36}} = \frac{1.5}{6} = 0.25$$

Standard error: 0.25

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

Shape: Approx. Normal

Mean: 8

$$SE = \frac{\sigma}{\sqrt{n}} = \frac{1.5}{\sqrt{100}} = \frac{1.5}{10} = 0.15$$

Standard error: 0.15

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

$$SE = \frac{1.5}{\sqrt{64}}$$

Mean: 8

Standard error: 0.1875

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

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

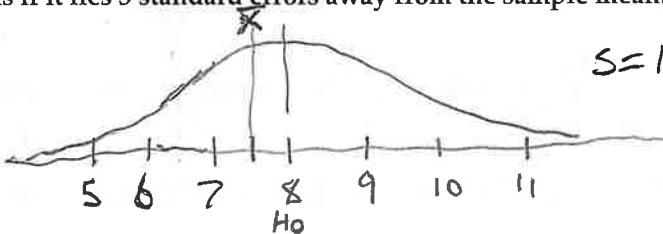
Q3. You are interested in whether students sleep on average 8 hours per night. You take one sample of 100 students ($n = 100$) with an average sleep time (\bar{x}) of 7.5 hours and standard deviation (S) of 1. You have decided in advance to reject the null hypothesis if it lies 3 standard errors away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

a) Describe the sampling distribution.

Shape: t-distribution

Mean: 8

Standard error: 0.8

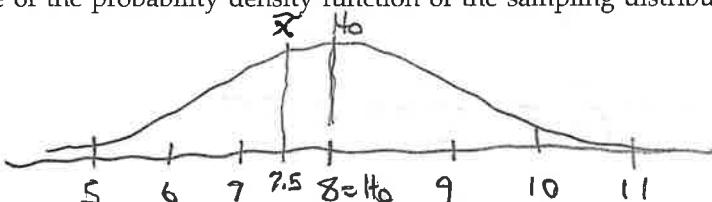


b) Construct the confidence interval for your test.

Lower Bound: 5

Upper Bound: 11

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



d) Using this confidence interval, are you able to reject the null hypothesis?

YES NO

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.

If the null hypothesis were true, we'd see students sleep 7.8 hrs or more only about 12% of the time.

Name: Jay Zheng

Student ID: 4766538

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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

Mean: 8

$$\frac{\sigma}{\sqrt{n}} = \frac{1.5}{\sqrt{1}}$$

Standard error: 1.5

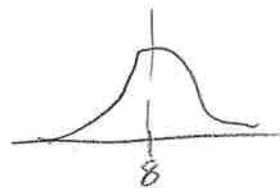
b) If you sample 36 students ($n = 36$), what is the sampling distribution of the sample mean?

Shape: Approximately normal with CLT

Mean: 8

Standard error: $\frac{1}{4}$

$$\frac{1.5}{\sqrt{36}} = \frac{1.5}{6} = \frac{3}{12} = \frac{1}{4}$$

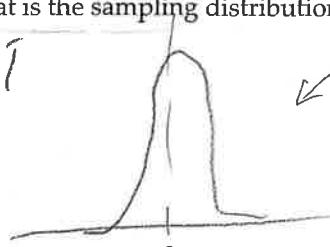


c) If you sample one student ($n = 100$), what is the sampling distribution of the sample mean?

Shape: Approximately normal by CLT

Mean: 8

Standard error: $\frac{3}{10}$



$$\frac{1.5}{\sqrt{100}} = \frac{1.5}{10} = \frac{3}{20} =$$

6

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: Approximately normal closer to population μ w CLT as we know μ and σ

Mean: 8

$$\frac{1.5}{\sqrt{64}} = \frac{1.5 \times 2}{8 \times 2} = \frac{3}{16}$$

Standard error: $\frac{3}{16}$

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

- The sample mean will equal the population mean when n is large enough $\rightarrow ?$
- The individual data points in a sample will follow a normal distribution
- The distribution of sample means will approach a normal distribution
- The population distribution must be normal for the theorem to apply $\rightarrow NO$

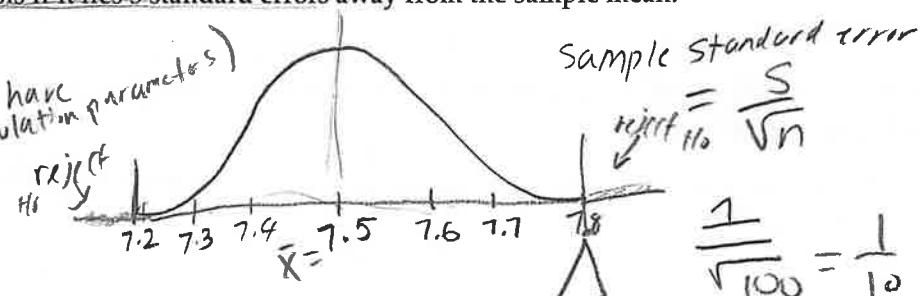
Q3. You are interested in whether students sleep on average 8 hours per night. You take one sample of 100 students ($n = 100$) with an average sleep time (\bar{x}) of 7.5 hours and standard deviation (S) of 1. You have decided in advance to reject the null hypothesis if it lies 3 standard errors away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

a) Describe the sampling distribution.

Shape: t distribution (we don't have population parameters)

Mean: 7.5

Standard error: $\frac{1}{10}$



b) Construct the confidence interval for your test.

Lower Bound: 7.2

Upper Bound: 7.8

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

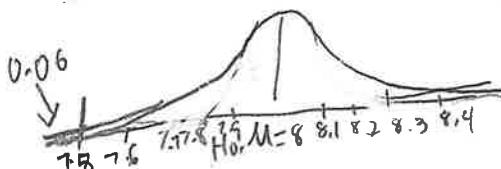
$[7.2, 7.8]$ centered around \bar{x}

$H_0: \mu = 8$ reject not in confidence interval

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

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.

If the students actually sleep an average 8 hours per night, we'd observe an extreme value value 0.12% of the time



Name: Daren Cen

Student ID: 4746297

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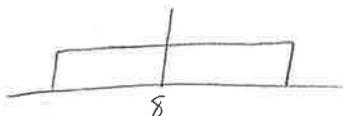
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Q1. A class's average sleep time follows an *exponential distribution* with mean (μ) of 8 hours and standard deviation (σ) of 1.5 hours.

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

Shape: Uniform

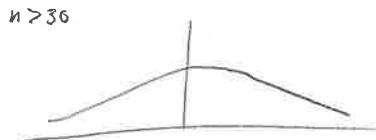


Mean: 8

Standard error: 1.5

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

Shape: Approx. Normal



Mean: 15

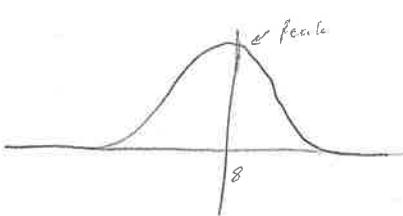
Standard error: $\frac{1.5}{\sqrt{36}} \approx \frac{1}{4}$

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

Shape: Normal

Mean: 8

Standard error: $\frac{1.5}{\sqrt{100}} \approx \frac{1.5}{10}$



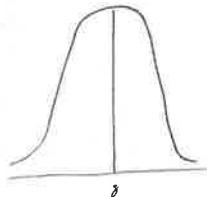
Q2. You take 1000 samples ($n = 64$) of classes, each with sleep times following an exponential distribution with mean (μ) of 8 hours and standard deviation (σ) of 1.5 hours (same as in Q1).

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: Normal

Mean: 8

Standard error: $\frac{1.5}{\sqrt{64}} \approx \frac{1.5}{8}$



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 ✓
- 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.

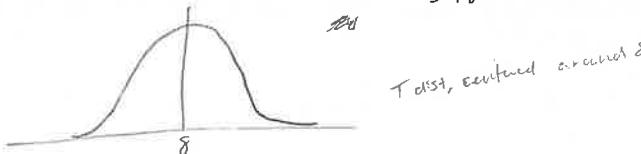
Do math different.
and S is given
My thinking is to expand

a) Describe the sampling distribution.

Shape: Normal

Mean: 7.5

Standard error: 1



b) Construct the confidence interval for your test.

Lower Bound: 5

Upper Bound: 11

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

[4.5, 10.5] centered around \bar{x}

11

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

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.

Assuming the sample is normal, the chance of randomly observing this sample mean of 7.8 hours a night is 12%.

Name: Katie Hovan

Student ID: 4655199

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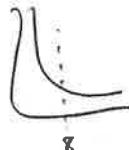
Q1. A class's average sleep time follows an *exponential* distribution with mean (μ) of 8 hours and standard deviation (σ) of 1.5 hours.

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

Shape: exponential

Mean: 8

Standard error: 1.5



$$\begin{aligned} \mu &= 8 \\ \sigma &= 1.5 \end{aligned}$$

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

Shape: binomial

$$SE = \frac{1.5}{\sqrt{36}} = \frac{1.5}{6} = 0.25$$

Mean: 8

Standard error: 0.25



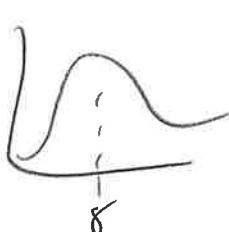
c) If you sample one student ($n = 100$), what is the sampling distribution of the sample mean?

Shape: approx normal

Mean: 8

Standard error: 0.15

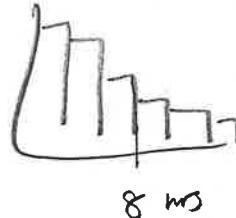
$$SE = \frac{1.5}{\sqrt{100}} = \frac{1.5}{10} = 0.15$$



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:

$$\begin{array}{ll} n = 64 & \\ \text{Shape: exponential} & \sigma = 1.5 \\ \text{Mean: } 8 & \mu = 8 \\ \text{Standard error: } 0.1875 & \end{array}$$



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.
- 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.

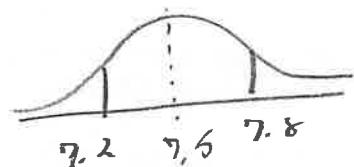
a) Describe the sampling distribution.

Shape: approx. normal

Mean: 7.5

Standard error: 3

$$\begin{array}{ll} n = 100 & 7.5 - \frac{3}{\sqrt{100}} = 7.4 \\ \bar{x} = 7.5 & \\ \sigma = 1 & 7.5 - \frac{3}{\sqrt{100}} = 7.2 \\ & 7.5 + \frac{3}{\sqrt{100}} = 7.8 \end{array}$$



b) Construct the confidence interval for your test.

Lower Bound: 7.2

Upper Bound: 7.8

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

$$7.8 - 7.2 = .6$$

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

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 difference from the test avg to actual avg

Name: Alexis Alveron

Student ID: 4620752

ECON 0150 | MiniExam 3 | Fall 2025

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AA I will not communicate directly or indirectly with others during the MiniExam.

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: uniform

Mean: 8

Standard error: 0

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

Shape: normal $\bar{x} =$

Mean: 8

Standard error: $1.5 / \sqrt{36} = 1.5 / 6$

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

Shape: normal

Mean: 8

Standard error: $1.5 / \sqrt{100} = 1.5 / 10$

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: normal

Mean: 8

Standard error: $1.5/\sqrt{64} = 1.5/8$

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

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: normal

Mean: 7.5

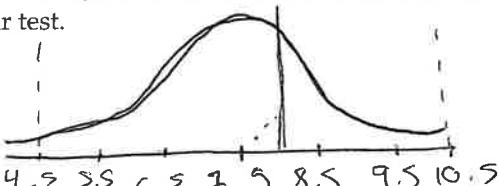
Standard error: $1/\sqrt{100} = 1/10$

b) Construct the confidence interval for your test.

Lower Bound: 4.5

Upper Bound: 10.5

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



$$7.5 + 3 \text{ standard errors } (3/10) = 7.8$$

$$8 > 7.8$$

d) Using this confidence interval, are you able to reject the null hypothesis?

YES NO

Yes, we reject

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.

we expect that 12% of the time, we would get a sample mean of 7.8.

Name: Aina Chan

Student ID: 1645883

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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: _____ 1.5

Mean: 8 |

Standard error: 1.5

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

Shape: _____

Mean: 8

Standard error: 1/6

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

Shape: _____

Mean: 8

Standard error: 1/10

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: _____

Mean: 8

$$\sqrt{64}$$

Standard error: 1.176

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

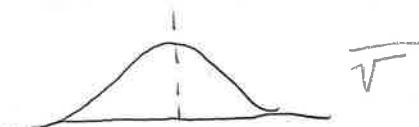
- The sample mean will equal the population mean when n is large enough
- The individual data points in a sample will follow a normal distribution
- The distribution of sample means will approach a normal distribution
- The population distribution must be normal for the theorem to apply

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: _____

Mean: 7.5



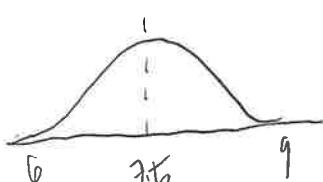
Standard error: 0.075

b) Construct the confidence interval for your test.

Lower Bound: 6

Upper Bound: 9

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



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

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.

a p-value of 0.12 means there is sleeping under the hypothesis and should reject the hypothesis

Name: Sophia Ghobrial

Student ID: 4611953

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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

Mean: 8 hours

Standard error: 1.5 hours

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

Shape: approx normal

Mean: 8 hours

$$SE = \frac{1.5}{\sqrt{36}}$$

Standard error: 0.25 hours

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

Shape: approx normal

Mean: 8 hours

Standard error: 0.15 hours $SE = \frac{1.5}{\sqrt{100}}$

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

Mean: 8 hours

Standard error: 0.047 hours $SE = \frac{1.5}{\sqrt{1000}} = 0.047$

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
- 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 distribution

center
on null
Mean: 8 hours

$$SE = \frac{1}{\sqrt{100}} = 0.1$$

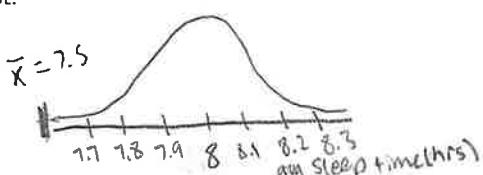
Standard error: 0.1 hours

b) Construct the confidence interval for your test.

Lower Bound: 7.7 hours

Upper Bound: 8.3 hours

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



7.5 below lower bound

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

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.

If average sleep time for students is 8 hours per night, the probability of observing a sleep time as extreme or more extreme than 7.8 hours per night is 0.12.

Name: Hannah Ghobrial

Student ID: 4611952

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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

Mean: 8

$$\frac{1.5}{\sqrt{1}}$$

Standard error: 1.5

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

Shape: approximately normal

Mean: 8

$$\frac{1.5}{\sqrt{36}} = \frac{1.5}{6}$$

Standard error: 0.25

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

Shape: approximately normal

Mean: 8

$$\frac{1.5}{\sqrt{100}} = \frac{1.5}{10} =$$

Standard error: 0.15

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: approximately normal

Mean: 8

$$\frac{1.5}{\sqrt{100}} = .047$$

Standard error: .047

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
- 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 distribution

$$\frac{1}{\sqrt{100}} = \frac{1}{10}$$

Mean: 8

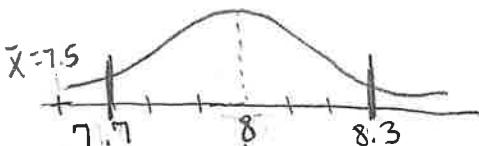
Standard error: .1

b) Construct the confidence interval for your test.

Lower Bound: 7.7

Upper Bound: 8.3

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



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

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.

If students truly sleep an average of 8 hours per night, we'd observe a sample mean of 7.5 hours per night 12% of the time.

Name: Joseph Ambroffi

Student ID: 9693682

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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: Uniform

$$\frac{\sigma}{\sqrt{n}} = \frac{1.5}{\sqrt{1}} = 1.5$$

Mean: 8

Standard error: 1.5

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

Shape: Approx Normal

$$\frac{\sigma}{\sqrt{n}} = \frac{1.5}{\sqrt{36}} = \frac{1.5}{6} = 0.25$$

Mean: 8

Standard error: 0.25

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

Shape: Approx Normal

$$\frac{\sigma}{\sqrt{n}} = \frac{1.5}{\sqrt{100}} = \frac{1.5}{10} = 0.15$$

Mean: 8

Standard error: 0.15

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:

$$SE = \frac{\sigma}{\sqrt{n}} = \frac{1.5}{\sqrt{64}} = \frac{1.5}{8} = 0.1875$$

Shape: Approx. Normal

Mean: 8

Standard error: 0.1875

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

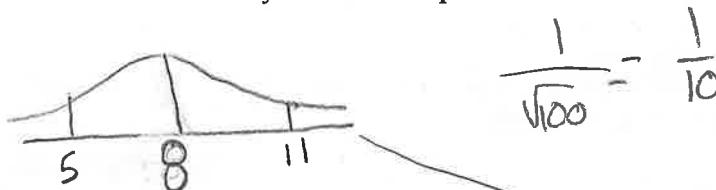
Q3. You are interested in whether students sleep on average 8 hours per night. You take one sample of 100 students ($n = 100$) with an average sleep time (\bar{x}) of 7.5 hours and standard deviation (S) of 1. You have decided in advance to reject the null hypothesis if it lies 3 standard errors away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

a) Describe the sampling distribution.

Shape: Approx Normal

Mean: 7.5

Standard error: $\frac{1}{10} = 0.1$



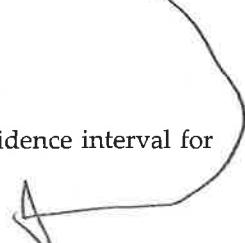
$$\frac{1}{\sqrt{100}} = \frac{1}{10}$$

b) Construct the confidence interval for your test.

Lower Bound: 5

Upper Bound: 11

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



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

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.

We would observe a difference of 7.8 or more extreme 12% of the time

Name: Kiersten Engstrom

Student ID: 4719223

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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: Uniform

Mean: 8

$$\frac{1.5}{\sqrt{1}} = \frac{1.5}{1} = 1.5$$

Standard error: 1.5

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

Shape: Approximately normal

Mean: 8

$$\frac{1.5}{\sqrt{36}} = \frac{1.5}{6} = \frac{3}{12} = \frac{1}{4}$$

Standard error: .25

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

Shape: Approximately normal

Mean: 8

Standard error: $\frac{1.5}{\sqrt{100}}$ or $\frac{6}{40}$

$$\frac{1.5}{\sqrt{100}} = \frac{1.5}{10} = \frac{3}{20} = \frac{1}{20}$$

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: Approximately normal

Mean: 8

$$\frac{1.5}{\sqrt{64}} \quad \frac{1.5}{8} \quad \frac{3}{2} \quad \frac{2}{16} = \frac{6}{32}$$

Standard error: $\frac{1.5}{\sqrt{64}}$ or $\frac{1.5}{8}$

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

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: Normal

Mean: 7.5

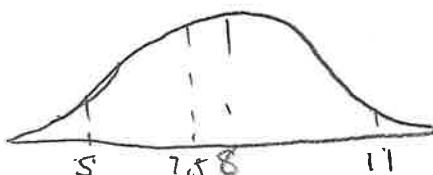
Standard error: 1

b) Construct the confidence interval for your test.

Lower Bound: 5

Upper Bound: 11

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



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

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.

We are not confident that the average student sleeps 7.8 hours per night. Because the p-value is greater than .05.

Name: mckenna hooks

Student ID: 4785 940

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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: uniform

Mean: 8

Standard error: 1.5

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

Shape: approx. normal

Mean: 8

Standard error: $\frac{4}{3}$

$$\frac{8}{\sqrt{36}} = \frac{8 \div 2}{6 \div 2} = \boxed{\frac{4}{3}}$$

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

Shape: approx. normal

Mean: 8

Standard error: $\frac{4}{10}$

$$\frac{8}{\sqrt{100}} = \frac{8 \div 2}{10 \div 2} = \frac{4}{5}$$

Sample size = 100

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

Mean: 8

Standard error: 1.5

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

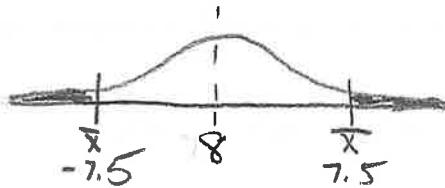
Q3. You are interested in whether students sleep on average 8 hours per night. You take one sample of 100 students ($n = 100$) with an average sleep time (\bar{x}) of 7.5 hours and standard deviation (S) of 1. You have decided in advance to reject the null hypothesis if it lies 3 standard errors away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

- a) Describe the sampling distribution.

Shape: approx normal

Mean: 7.5

Standard error: $\frac{1}{100}$

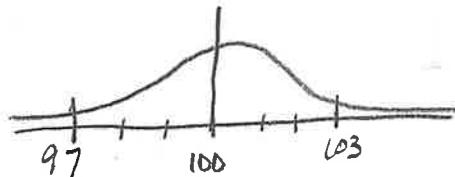


- b) Construct the confidence interval for your test.

Lower Bound: 97

Upper Bound: 103

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



- d) Using this confidence interval, are you able to reject the null hypothesis?

YES NO

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.

If the test had no effect, we'd observe a difference on average of 7.8 hours and more extreme 12% of the time

Name: Lauren Stuccio

Student ID: 4619490

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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

$$se = \frac{1.5}{\sqrt{1}} = 1.5$$

Mean: 8

Standard error: 1.5

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

Shape: approx normal

Mean: 8

$$\frac{1.5}{\sqrt{36}} = \frac{1.5}{6}$$

Standard error: 1.5/6

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

Shape: approx normal

Mean: 8

$$\frac{1.5}{\sqrt{100}} = \frac{1.5}{10}$$

Standard error: 1.5/10

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: Exponential $SE = \frac{1.5}{\sqrt{n}} = \frac{1.5}{\sqrt{64}} = \frac{1.5}{8}$
 Mean: 8 Standard error: $1.5/8$

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

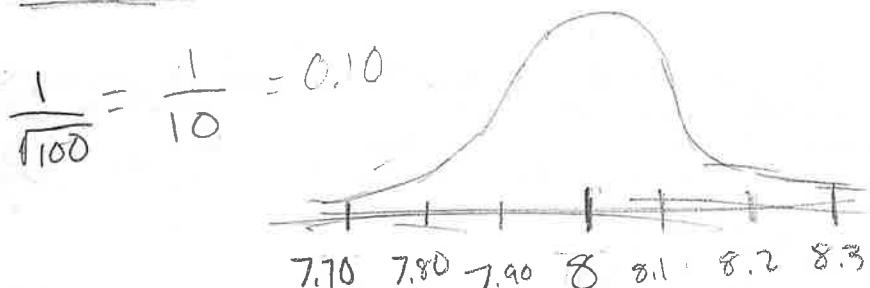
Q3. You are interested in whether students sleep on average 8 hours per night. You take one sample of 100 students ($n = 100$) with an average sleep time (\bar{x}) of 7.5 hours and standard deviation (S) of 1. You have decided in advance to reject the null hypothesis if it lies 3 standard errors away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

a) Describe the sampling distribution.

Shape: t distribution

Mean: 8

Standard error: $1/10$

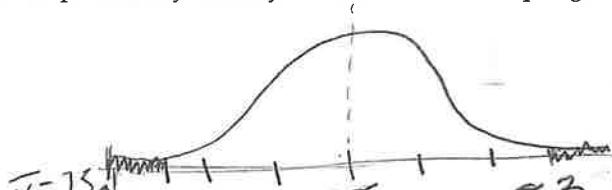


b) Construct the confidence interval for your test.

Lower Bound: 7.7

Upper Bound: 8.3 hrs

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



d) Using this confidence interval, are you able to reject the null hypothesis?

YES NO

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.

This p-value means that we are very confident the average sleep time is not 7.5 hrs, and is more extreme 12% of the time

Name: Riley Widdop

Student ID: 4646592

ECON 0150 | MiniExam 3 | Fall 2025

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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

Mean: 8

$$\frac{\sigma}{\sqrt{n}} = \frac{1.5}{\sqrt{1}} = 1.5$$

Standard error: 1.5

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

Shape: approx normal

Mean: 8

$$\frac{1.5}{\sqrt{36}} = \frac{1.5}{6} = 0.25 = se$$

Standard error: 0.25



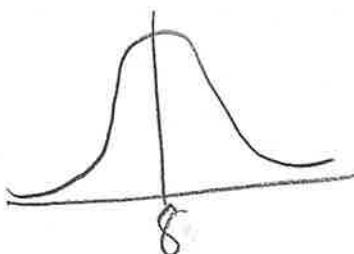
c) If you sample one student ($n = 100$), what is the sampling distribution of the sample mean?

Shape: approx normal

Mean: 8

Standard error: 0.15

$$se = \frac{1.5}{\sqrt{100}} = \frac{1.5}{10}$$



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

Mean: 8

$$SE = \frac{\sigma}{\sqrt{n}} = \frac{1.5}{\sqrt{64}} = \frac{1.5}{8}$$

Standard error: 1.5/8

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
- 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.

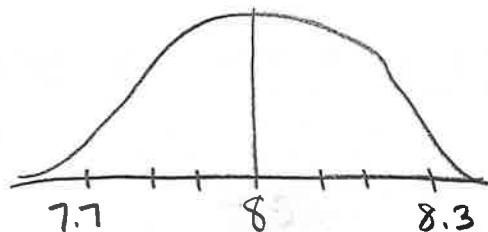
a) Describe the sampling distribution.

Shape: t-distribution

Mean: 8

$$SE = \frac{1}{\sqrt{100}}$$

Standard error: 1/10

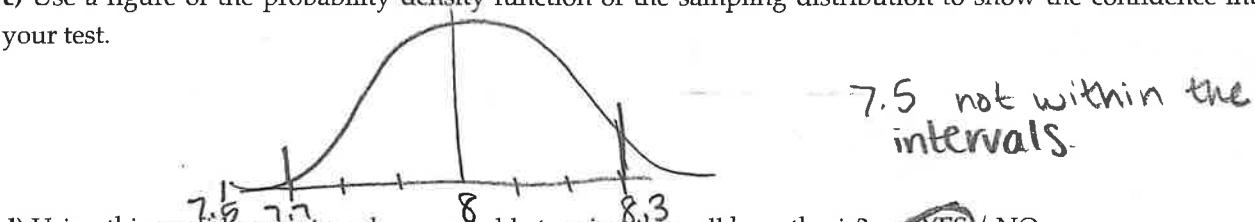


b) Construct the confidence interval for your test.

Lower Bound: 7.7

Upper Bound: 8.3

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



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

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.

This p-value means that it will be more extreme than that 12% of the time. 12% of the time students sleep less than 7.8.

Name: Ava Carragher

Student ID: 4621779

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AC I will not communicate directly or indirectly with others during the MiniExam.

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

Mean: 8



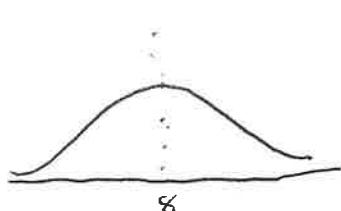
$$\frac{1.5}{\sqrt{1}} = 1.5$$

Standard error: 1.5

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

Shape: Approx. normal

Mean: 8



$$\frac{1.5}{\sqrt{36}} \rightarrow \frac{\frac{3}{2}}{6} \times \frac{1}{6} \rightarrow \frac{3}{12}$$

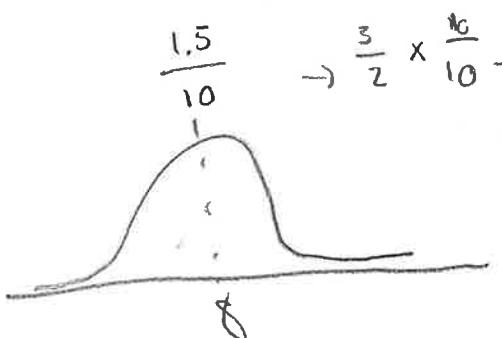
Standard error: $\frac{1.5}{\sqrt{6}}$ or $\frac{1}{4}$

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

Shape: Approx. normal

Mean: 8

Standard error: $\frac{1.5}{\sqrt{10}}$ or $\frac{3}{20}$



$$\rightarrow \frac{\frac{3}{2}}{10} \times \frac{10}{10} \rightarrow \frac{3}{20}$$

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

$$\frac{1.5}{\sqrt{64}} \quad \frac{1.5}{8} \quad \frac{\frac{3}{2} \times \frac{1}{8}}{8} \rightarrow \frac{3}{16}$$

Mean: 8

Standard error: $\frac{3}{16}$

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

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

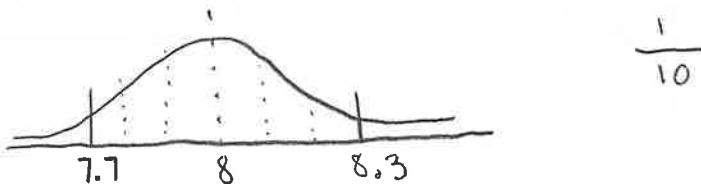
Q3. You are interested in whether students sleep on average 8 hours per night. You take one sample of 100 students ($n = 100$) with an average sleep time (\bar{x}) of 7.5 hours and standard deviation (S) of 1. You have decided in advance to reject the null hypothesis if it lies 3 standard errors away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

a) Describe the sampling distribution.

Shape: Approx. normal

Mean: 8

Standard error: $\frac{1}{10}$

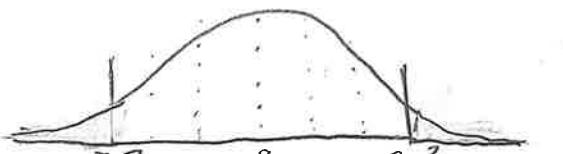


b) Construct the confidence interval for your test.

Lower Bound: 7.7 hours

Upper Bound: 8.3 hours

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



d) Using this confidence interval, are you able to reject the null hypothesis?

YES NO because $\bar{x} = 7.5$ which is outside the confidence interval.

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.

If students truly sleep 7.8 hours per night on average, we would observe a difference of the observed results or more extreme 12% of the time.

Name: Jean-Luc Tessier

Student ID: 4652635

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JLT I will complete this MiniExam solely using my own work.

JLF I will not use any digital resources unless explicitly allowed by the instructor.

JLI I will not communicate directly or indirectly with others during the MiniExam.

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

Mean: 8

Standard error: 1.5

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

Shape: Approx. Normal

$$\frac{1.5}{6}$$

Mean: 8

Standard error: .25

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

Shape: Approx. Normal

Mean: 8

$$\frac{1.5}{10}$$

Standard error: .15

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

Mean: 8 Standard error: $\frac{1.5}{\sqrt{64}}$

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
- 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: Approx. Normal

Mean: 7.5

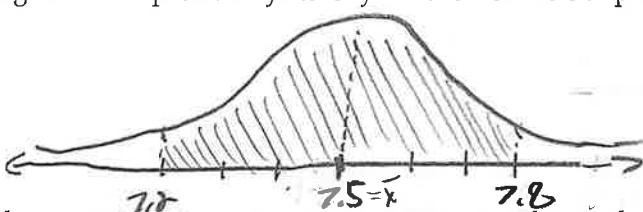
Standard error: 0.1

b) Construct the confidence interval for your test.

Lower Bound: 7.2

Upper Bound: 7.8

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



$$H_0: \mu = 8$$

$$H_A: \mu \neq 8$$

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

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.

IF null hypothesis is true, we would expect to see data as extreme or more extreme than $\bar{x} = 7.8$ 12% of the time.

Name: Matt Stiles

Student ID: 4671920

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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: uniform

$$\frac{1.5}{\sqrt{1}} = 1.5$$

Mean: 8

Standard error: 1.5



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

Shape: approx normal

Mean: 8

Standard error: .25

$$\frac{1.5}{\sqrt{36}}$$



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

Shape: approx normal

Mean: 8

Standard error: .15

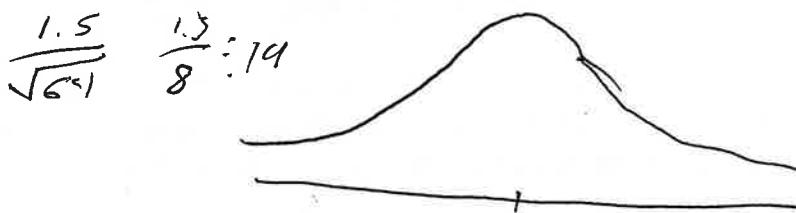
$$\frac{1.5}{\sqrt{100}} \quad \frac{1.5}{10} \quad .15\%$$



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



Mean: 8

Standard error: .19

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

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: approx normal

$$\frac{1}{\sqrt{100}}$$

Mean: 8

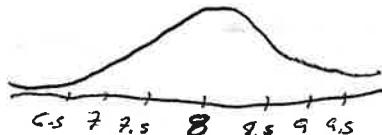
Standard error: .10

b) Construct the confidence interval for your test.

Lower Bound: 6.5 hours

Upper Bound: 9.5 hours

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



d) Using this confidence interval, are you able to reject the null hypothesis?

YES / NO

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.

p-value shows no effect, we'd observe a 12% chance in difference of 1.5 hours per night

Name: Chase Nance

Student ID: 4654536

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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: Uniform

$$\frac{1.5}{\sqrt{n}}$$

Mean: 8

Standard error: 1.5

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

Shape: Approx Normal

Mean: 8

Standard error: .14 (0.25)

$$\frac{1.5}{\sqrt{36}} = \frac{1.5}{6}$$

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

Shape: Normal

Mean: 8

Standard error: .15

$$\frac{1.5}{\sqrt{100}}$$

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

$$\frac{1.5}{\sqrt{64}}$$

$$\frac{1.5}{8}$$

Mean: 8

Standard error: .1975



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

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

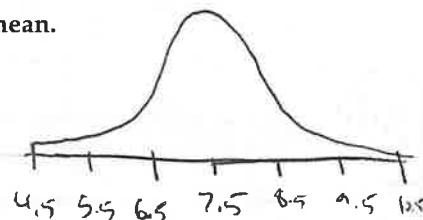
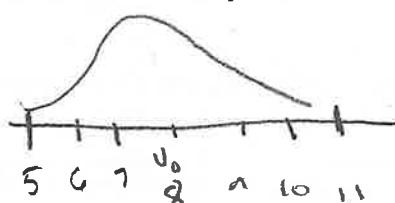
Q3. You are interested in whether students sleep on average 8 hours per night. You take one sample of 100 students ($n = 100$) with an average sleep time (\bar{x}) of 7.5 hours and standard deviation (S) of 1. You have decided in advance to reject the null hypothesis if it lies 3 standard errors away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

a) Describe the sampling distribution.

Shape: approx normal

Mean: 8 or 7.5

Standard error: .10



b) Construct the confidence interval for your test.

Lower Bound: 5 or 4.5

Upper Bound: 11 or 10.5

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

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

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.

If the students truly sleep for 7.8 hours a night

we would observe them sleep for 7.8 hours or more 12% of the time

Name: Kepi Zhang

Student ID: 4692242

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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

Mean: 8

Standard error: 1.5.

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

Shape: Approx. Normal

Mean: 8

Standard error: 0.25 $\frac{1.5}{\sqrt{36}}$ $\frac{1.5}{6}$ $\frac{1}{4}$.

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

Shape: Approx. Normal.

Mean: 8

Standard error: 0.15 $\frac{1.5}{\sqrt{100}}$

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: Aprox. Normal.

Mean: 8.

Standard error: $\frac{3}{\sqrt{64}}$

$$\frac{1.5}{\sqrt{64}} = \frac{3}{16}$$

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

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.

$$Se = \frac{1}{\sqrt{100}} = 0.1$$

Shape: Normal.

$$0.3$$

Mean: 7.5

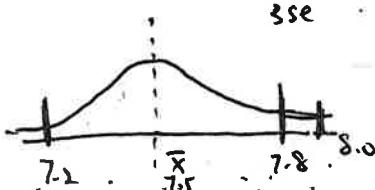
Standard error: 0.1

b) Construct the confidence interval for your test.

Lower Bound: 7.2

Upper Bound: 7.8

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



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

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.

p-value = 0.12 means that the chance of obtaining at least extreme ~~as~~ as the data in the sample is 12%.

Name: Scarlett Weir

Student ID: 4759355

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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: Uniform

Mean: 8

$$SE = \frac{1.5}{\sqrt{1}} = 1.5$$

Standard error: 1.5

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

Shape: Slightly Skewed/Aprox. Normal

Mean: 8

$$SE = \frac{1.5}{\sqrt{36}}$$

Standard error: 1.5

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

Shape: Aprox. Normal

Mean: 8

$$SE = \frac{1.5}{\sqrt{100}}$$

Standard error: 1.5

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: Slightly skewed $SE = \frac{1.5}{\sqrt{64}} = \frac{1.5}{8}$

Mean: 8

Standard error: $\frac{1.5}{8}$

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

- 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. $SE = \frac{1}{\sqrt{100}}$

Shape: Approx. Normal

$$[8 \pm (1 \times 3)]$$

Mean: 7.5

$$[5, 11]$$

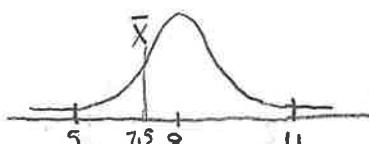
Standard error: $\frac{1}{\sqrt{100}}$

b) Construct the confidence interval for your test.

Lower Bound: 5

Upper Bound: 11

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



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

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 of 0.12 is the probability, 12%, of observing that whether students sleep on average 7.8 hours per night is at least as extreme.

Name: Mikailyn Matacavage

Student ID: 4656 864

ECON 0150 | MiniExam 3 | Fall 2025

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WWI will complete this MiniExam solely using my own work.

WWI will not use any digital resources unless explicitly allowed by the instructor.

WWI will not communicate directly or indirectly with others during the MiniExam.

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 uniform

Mean: 8

Standard error: 1.5

$$\frac{1.5}{\sqrt{1}} = 1.5$$



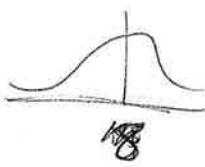
b) If you sample 36 students ($n = 36$), what is the sampling distribution of the sample mean?

Shape: approx Norm

Mean: 8

Standard error: 0.25

$$\frac{1.5}{\sqrt{36}} = \frac{1.5}{6} = 0.25$$



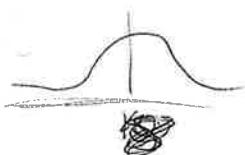
c) If you sample one student ($n = 100$), what is the sampling distribution of the sample mean?

Shape: approx Norm

Mean: 8

Standard error: 0.15

$$\frac{1.5}{\sqrt{100}} = \frac{1.5}{10} = 0.15$$



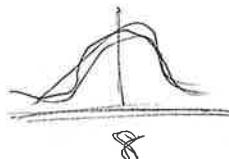
Q2. You take 1000 samples ($n = 64$) of classes, each with sleep times following an *exponential distribution* with mean (μ) of 8 hours and standard deviation (σ) of 1.5 hours (same as in Q1).

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

Mean: 8

Standard error: 0.1875 $\frac{1.5}{\sqrt{64}} = \frac{1.5}{8} = 0.1875$



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
- 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: approx. normal

$$7.5 - 0.3 = 7.2$$

$$7.5 + 0.3 = 7.8$$

Mean: 7.5

Standard error: 0.10

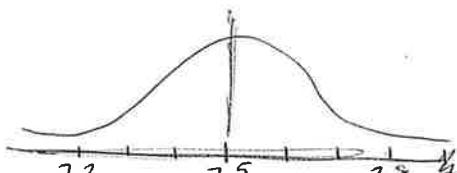
$$\frac{1}{\sqrt{100}} = \frac{1}{10} = 0.10$$

b) Construct the confidence interval for your test.

Lower Bound: 7.2

Upper Bound: 7.8

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



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

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.

If there is no effect, observe difference of 8 hrs or more extreme 12% of the time.

Name: Ruixuan Li

Student ID: 4681348

ECON 0150 | MiniExam 3 | Fall 2025

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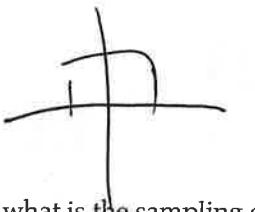
Q1. A class's average sleep time follows an *exponential* distribution with mean (μ) of 8 hours and standard deviation (σ) of 1.5 hours.

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

Shape: Exponential —

Mean: 8

Standard error: 1.5



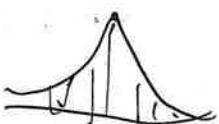
$$\frac{1.5}{1}$$

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

Shape: Approximately normal

Mean: 8

Standard error: 0.25



$$\frac{1.5}{\sqrt{36}}$$

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

Shape: Approximately normal

Mean: 8

Standard error: 0.15

$$\frac{1.5}{\sqrt{100}} = 0.15$$

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: Approximately normal ~~(skewed)~~

Mean: 8

Standard error: 0.1875

$$\frac{1.5}{\sqrt{64}} = \frac{1.5}{8} = 0.1875$$

$$8 \sqrt{1.5} = \frac{8}{\sqrt{1.5}} = \frac{8}{\sqrt{\frac{3}{2}}} = \frac{8}{\sqrt{3}} = \frac{8}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{8\sqrt{3}}{3}$$

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

C

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

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: Normal

Mean: 8

Standard error: 0.1

$$\frac{1}{\sqrt{n}} = \frac{1}{\sqrt{100}} = 0.1$$

$$7.5 \pm 0.1$$

b) Construct the confidence interval for your test.

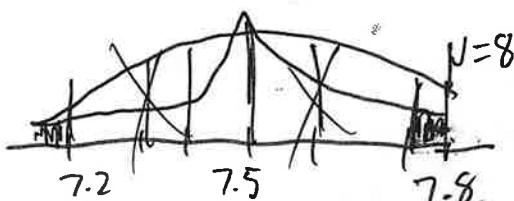
Lower Bound: 7.2

Upper Bound: 7.8

$$7.5 \pm 3$$

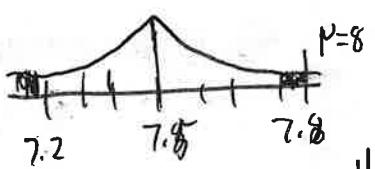
c) Use a figure of the probability density function of the sampling distribution to show the confidence interval for your test.

Rejected H₀



$$\mu = 8 > 7.8$$

YES / NO



we reject the null hypothesis.

d) Using this confidence interval, are you able to reject the null hypothesis?

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.

~~Yes, we reject the null hypothesis.~~

If p-value = 0.12, it means there is a 12% probability of obtaining a sample mean as extreme as the observed one, assuming the null hypothesis is true.

Name: Xifan Zheng

Student ID: 4681906

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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

Mean: 8

Standard error: 1.5

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

Shape: Approximately Approximately normal-normal

Mean: 8

Standard error: 0.25

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

Shape: Approximately Normal

Mean: 8

Standard error: 0.15

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: Approximately Normal

Mean: 8

Standard error: 0.1875

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
- 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: Normal

Mean: 8

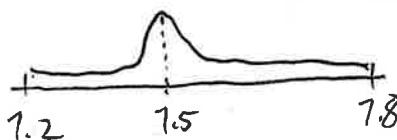
Standard error: 0.1

b) Construct the confidence interval for your test.

Lower Bound: 7.2

Upper Bound: 7.8

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



d) Using this confidence interval, are you able to reject the null hypothesis?

YES / NO

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.

P = 0.12 = 12% sample mean as extreme as the observed if the hypothesis is true.

Name: Adam Arriaga

Student ID: 4844780

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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

Mean: 8

Standard error: 1.5

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

Shape: Approx. Normal

Mean: 8

Standard error: 1.5

$$\frac{1.5}{\sqrt{36}} = \frac{1.5}{6}$$

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

Shape: Approx. Normal

Mean: 8

Standard error: 1.5

$$\frac{1.5}{\sqrt{100}}$$

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

Mean: 8

1.5

Standard error: $\frac{1.5}{\sqrt{64}}$

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
- 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.

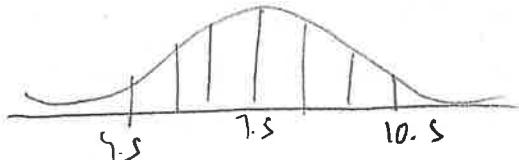
a) Describe the sampling distribution.

Shape: Approx. Normal

Mean: 7.5

1

Standard error: $\frac{1}{\sqrt{100}}$



b) Construct the confidence interval for your test.

Lower Bound: 4.5

Upper Bound: 10.5

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

d) Using this confidence interval, are you able to reject the null hypothesis?

YES, NO

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 probability of getting a sample mean as extreme as 7.5 hours given the population mean is 0.12.

Name: Eileen Hu

Student ID: 4641049

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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

Mean: 8

$$se = \frac{1.5}{\sqrt{1}} = 1.5$$

Standard error: 1.5

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

Shape: approx normal

Mean: 8

$$\frac{1.5}{\sqrt{36}} = \frac{1.5}{6} = 0.25$$

Standard error: 0.25

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

Shape: approx normal

Mean: 8

$$\frac{1.5}{\sqrt{100}} = \frac{1.5}{10} = .15$$

Standard error: .15

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

Mean: 8

$$\frac{1.5}{\sqrt{64}} = \frac{1.5}{8}$$

Standard error: 1875

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
- 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: approx normal

Mean: 7.5

$$\frac{1}{100} = \frac{1}{10}$$

Standard error: 0.1

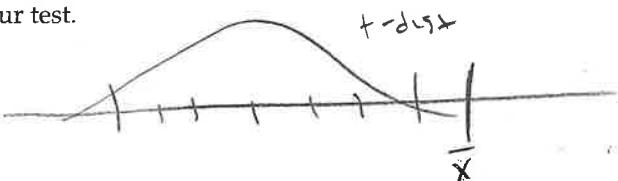
$$[7.5 \pm 3 \cdot 0.1]$$

b) Construct the confidence interval for your test.

Lower Bound: 7.2

Upper Bound: 7.8

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



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

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.

If the pop mean is not 7.8, there is a 12% chance of getting the results observed / more extreme

Name: Madelyn Steele

Student ID: 4869177

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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.

$$\begin{aligned} \mu &= 8 \text{ hrs} \\ \sigma &= 1.5 \text{ hrs} \end{aligned}$$

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

Shape: exponential

$$SE = \frac{\sigma}{\sqrt{n}} = 1.5$$

Mean: 8

Standard error: 1.5

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

Shape: approx normal
(approaching)

$$\frac{1.5}{\sqrt{36}} = \frac{1.5}{6}$$

Mean: 8

Standard error: 1/4

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

Shape: approx normal

Mean: 8

$$\frac{1.5}{\sqrt{100}} = \frac{1.5}{10}$$

Standard error: 1.5/10 or 0.15

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

Mean: 8

$$SE = \frac{1.5}{\sqrt{64}} = \frac{1.5}{8}$$

Standard error: $1.5/8$ or 0.1875

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
- 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.

$$\mu_0 = 8 \quad \bar{x} = 7.5$$

$$S = 1$$

$$n = 100$$

(Mean: 8)

$$SE = \frac{1}{\sqrt{100}} = \frac{1}{10}$$

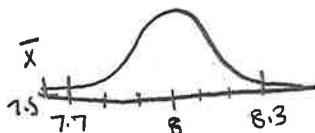
Standard error: $1/10$

b) Construct the confidence interval for your test.

Lower Bound: 7.1

Upper Bound: 8.3

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



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

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.

If it were true that students did not sleep 7.8 hours per night on average, we'd observe a sleep time as at 7.8 hours or more extreme 12.1% of the time

Name: Christian ercol

Student ID: 4717 326

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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

$$\frac{1.5}{\sqrt{n}}$$

Mean: 8

1.5

Standard error: ~~1.5~~

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

Shape: ~~Exponential~~ Normal

$$\frac{1.5}{\sqrt{36}}$$

Mean: 8

.25

Standard error: ~~.25~~

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

Shape: ~~Exponential~~ Normal

$$\frac{1.5}{\sqrt{100}}$$

Mean: 8

.15

Standard error: ~~.15~~

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:

~~Exponential~~ APPROX NORMAL

Shape: ~~Exponential~~

Mean: 8

$$\frac{1.5}{\sqrt{64}}$$

Standard error: $\frac{1.5}{8}$

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

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.

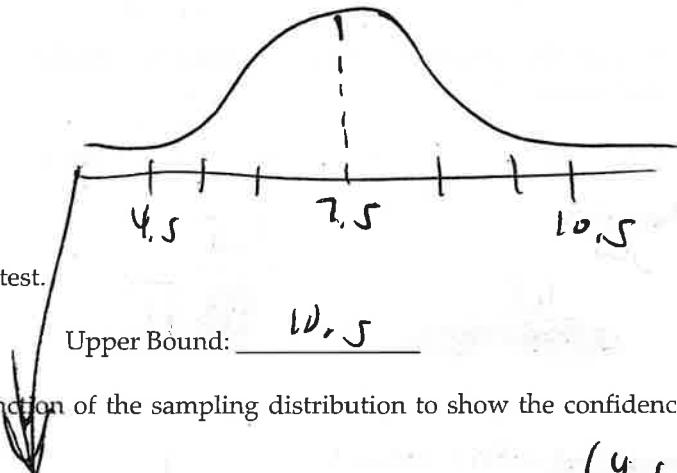
~~Approx normal~~

Shape: ~~Exponential~~

$$\frac{1}{100}$$

Mean: 7.5

Standard error: 0.1



b) Construct the confidence interval for your test.

Lower Bound: 4.5

Upper Bound: 10.5

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

(4.5, 10.5)

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

YES

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 means that there shouldn't be a difference on 7.8 hrs of sleep or more extreme 12% of the time

Name: Michael Canavan

Student ID: 4530247

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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



$$\frac{1.5}{\sqrt{1}}$$

Mean: 8

Standard error: 1.5

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

Shape: normal

$$\frac{1.5}{\sqrt{36}} = \frac{1.5}{6}$$

Mean: 8

Standard error: 0.25

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

Shape: normal

$$\frac{1.5}{\sqrt{100}} = \frac{1.5}{10} =$$

Mean: 8

Standard error: 0.15

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: normal

$$\text{Mean: } 8 \quad \frac{1.5}{\sqrt{64}} = \frac{1.5}{8}$$

Standard error: 0.1675

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
- 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.

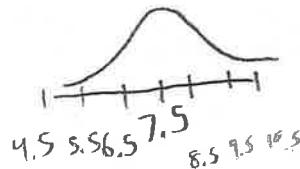
a) Describe the sampling distribution.

Shape: normal

Mean: 7.5

Standard error: 0.1

$$SE = \sqrt{\frac{1}{100}} = \frac{1}{10}$$

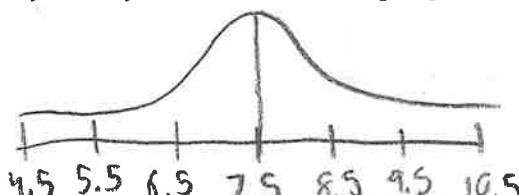


b) Construct the confidence interval for your test.

Lower Bound: 4.5

Upper Bound: 10.5

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



d) Using this confidence interval, are you able to reject the null hypothesis?

YES / NO

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.

we observe that students sleep 7.8 hours a night on average 12% of the time.

Name: Jason Perillo

Student ID: 4713813

ECON 0150 | MiniExam 3 | Fall 2025

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JP I will not communicate directly or indirectly with others during the MiniExam.

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

Mean: 8

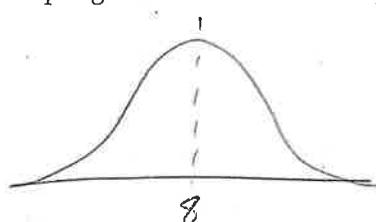
Standard error: 1.5

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

Shape: approx normal

Mean: 8

Standard error: 0.25



$$\frac{\sigma}{\sqrt{n}} = se \quad \frac{1.5}{\sqrt{36}}$$

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

Shape: approx normal

Mean: 8

Standard error: 0.15

$$\frac{1.5}{\sqrt{100}}$$

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

Mean: 8

Standard error: 0.1875

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

The population distribution must be normal for the theorem to apply

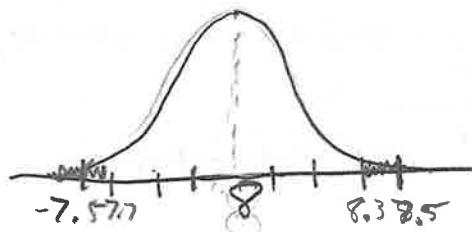
Q3. You are interested in whether students sleep on average 8 hours per night. You take one sample of 100 students ($n = 100$) with an average sleep time (\bar{x}) of 7.5 hours and standard deviation (S) of 1. You have decided in advance to reject the null hypothesis if it lies 3 standard errors away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

a) Describe the sampling distribution.

Shape: Approx Normal

Mean: 7.5

Standard error: 0.1

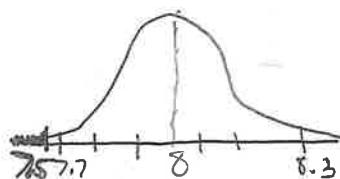


b) Construct the confidence interval for your test.

Lower Bound: 7.7

Upper Bound: 8.3

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



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

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.

If the student truly didn't sleep that long per night we'd observe a difference of 7.8 or more extreme 12% of the time.

Name: Zach Tucci

Student ID: 4642754

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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

$$SE = \frac{1.5}{\sqrt{1}} = 1.5$$

Mean: 8

Standard error: 1.5

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

Shape: Approximately exponential

$$SE = \frac{1.5}{\sqrt{36}} = \frac{1.5}{6} = \frac{1}{4}$$

Mean: 8

Standard error: 1/4

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

Shape: Approximate Exponential

Mean: 8

Standard error: 1/10

$$SE = \frac{1.5}{\sqrt{100}} = \frac{1.5}{10} = 0.15$$

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: normal

Mean: 8

Standard error: $\frac{1.5}{\sqrt{64}}$

$$SE = \frac{1.5}{\sqrt{64}}$$

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
- 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: normal

Mean: 7.5

Standard error: $\frac{1}{\sqrt{100}}$

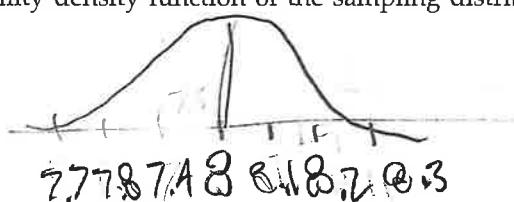
$$SE = \frac{1}{\sqrt{100}}$$

b) Construct the confidence interval for your test.

Lower Bound: 7.7

Upper Bound: 8.3

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



d) Using this confidence interval, are you able to reject the null hypothesis?

YES NO

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.

IF the average is found to be 8 hours, there is a 12% chance this is actually > 7.8 hours,

Name: Henry Gallup

Student ID: 4539909

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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

Mean: 8 hrs

Standard error: 1.5 hrs

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

Shape: Approx. Normal

Mean: 8 hrs

Standard error: 0.25 hrs $\rightarrow 1.5/\sqrt{36} = 1.5/6 = 0.25$

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

Shape: Approx Normal

Mean: 8 hrs

Standard error: 0.15 hrs

$$se = 1.5/\sqrt{100} = 1.5/10 = 0.15$$

8 hrs

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

Mean: 8 hrs

Standard error: 0.1875 hrs $Se = 1.5/\sqrt{64} = 1.5/8 = 0.1875$

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
- 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-distribution centered on the null

Mean: 7.5 hrs

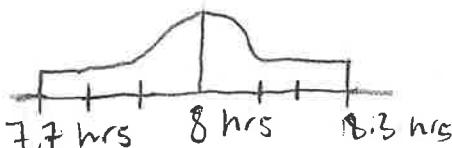
Standard error: 0.10 hrs $Se = 1/\sqrt{100} = 1/10 = 0.10$ $0.1 \times 3 = 0.3$

b) Construct the confidence interval for your test.

Lower Bound: 7.7 hrs

Upper Bound: 8.3 hrs

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



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

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.

Since the p-value is 0.12, it means we would observe a difference of 7.8 hrs or more extreme 12% of the time.

Name: Sofia Heine

Student ID: 4714846

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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

Mean: 8

Standard error: 1.5

$$SE = 1.5 / \sqrt{1}$$

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

Shape: skewed

Mean: 8

Standard error: $\frac{1.5}{\sqrt{36}}$ $SE = 1.5 / \sqrt{36}$

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

Shape: approx normal

Mean: 8

Standard error: $\frac{1.5}{\sqrt{100}}$ $SE = 1.5 / \sqrt{100}$



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: exponential

Mean: 8

$$\text{Standard error: } \frac{1.5}{\sqrt{64}} \text{ or } 0.1875$$

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
- 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.

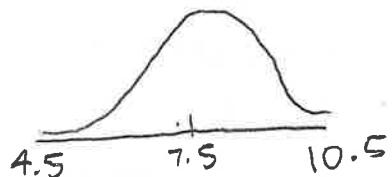
a) Describe the sampling distribution.

Shape: uniform

Mean: 7.5

Standard error: $\frac{1}{100}$

$$SE = \frac{1}{\sqrt{100}}$$

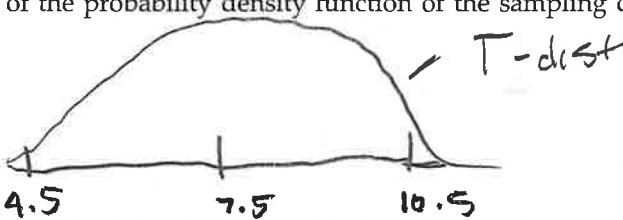


b) Construct the confidence interval for your test.

Lower Bound: 4.5

Upper Bound: 10.5

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



d) Using this confidence interval, are you able to reject the null hypothesis?

YES NO

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.

If students slept 7.8 hours, we would observe no difference of 7.8 hrs and/or less extreme 12% of the time

$$0.12 > 0.05$$

Name: Anthony Chirinos

Student ID: 4907004

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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

Mean: 8

Standard error: 1.5

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

Shape: Normal

Mean: 8

Standard error: $\frac{1.5}{\sqrt{36}}$

$$\frac{1.5}{\sqrt{36}} \rightarrow \frac{1.5}{6}$$

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

Shape: Normal

Mean: 8

Standard error: $\frac{1.5}{\sqrt{100}}$

$$\frac{1.5}{\sqrt{100}} \rightarrow \frac{1.5}{10}$$

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: Unimodal, Normal

Mean: 8

Standard error: $\frac{1.5}{\sqrt{64}}$

$$\frac{1.5}{\sqrt{64}} \rightarrow \frac{1.5}{8}$$

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
- 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.

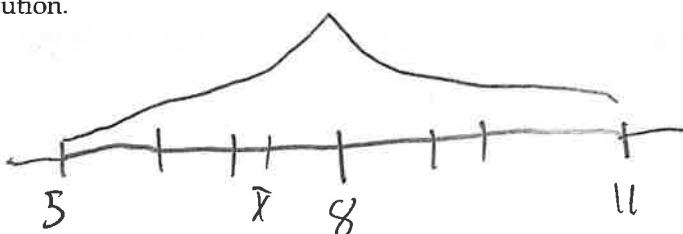
$$\sigma = 1$$

a) Describe the sampling distribution.

Shape: \bar{x} - dist

Mean: 7.5

Standard error: $\frac{1}{\sqrt{100}}$



$$\frac{1}{\sqrt{100}}$$

b) Construct the confidence interval for your test.

Lower Bound: 5

Upper Bound: 11

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

d) Using this confidence interval, are you able to reject the null hypothesis?

YES / NO

We must accept it

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.

A 12% chance of 7.8 hrs of sleep or a more extreme

Name: Madeline Karpas

Student ID: 4730220

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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

Mean: 8

Standard error: 1.5 $\frac{1.5}{\sqrt{1}} = 1.5$

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

Shape: approximately normal

Mean: 8

Standard error: .25 $\frac{1.5}{\sqrt{36}} = \frac{1.5}{6}$

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

Shape: normal

Mean: 8

Standard error: .15 $\frac{1.5}{\sqrt{100}}$

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: normal

Mean: 8

Standard error: $0.1875 \frac{1.5}{\sqrt{64}}$

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
- 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: normal

Mean: 7.5

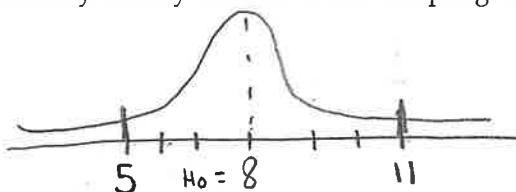
Standard error: $0.1 \frac{\sigma}{\sqrt{n}} = \frac{1}{\sqrt{100}}$

b) Construct the confidence interval for your test.

Lower Bound: 5

Upper Bound: 11

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



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

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.

If students sleep on average 7.8 hours per night we would observe extreme values 12% of the time.

Name: Kyle Molz

Student ID: 4660576

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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: Unifrom

Mean: 8

$$\frac{1.5}{\sqrt{1}} = 1.5$$

Standard error: 1.5

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

Shape: exponential

Mean: 8

$$\frac{1.5}{\sqrt{36}} = 0.25$$

Standard error: 0.25

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

Shape: exponential

Mean: 8

$$\frac{1.5}{\sqrt{100}} = 0.15$$

Standard error: 0.15

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

$$\frac{1.5}{\sqrt{64}} = 0.1875$$

Mean: 8

Standard error: 0.1875

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

The population distribution must be normal for the theorem to apply

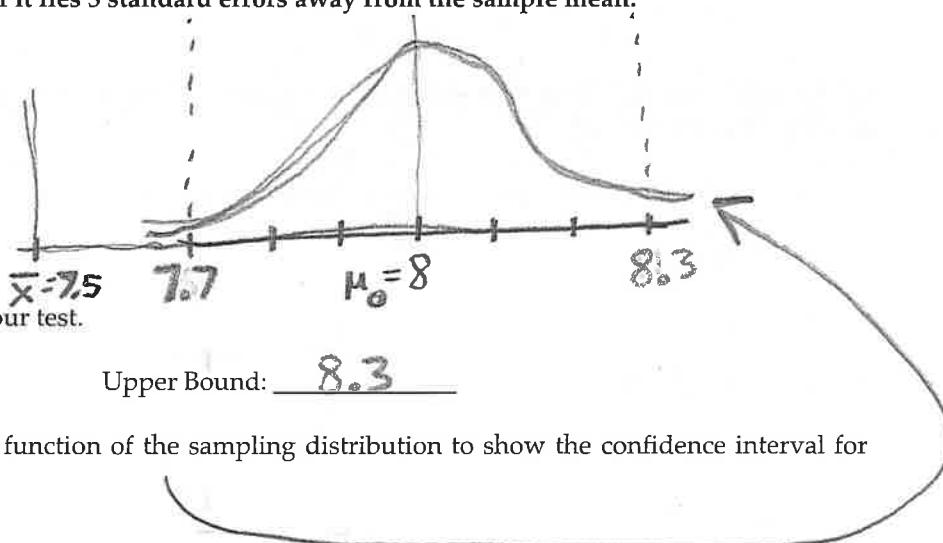
Q3. You are interested in whether students sleep on average 8 hours per night. You take one sample of 100 students ($n = 100$) with an average sleep time (\bar{x}) of 7.5 hours and standard deviation (S) of 1. You have decided in advance to reject the null hypothesis if it lies 3 standard errors away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

a) Describe the sampling distribution.

Shape: Approx. Normal

Mean: 7.5

Standard error: $\frac{1}{\sqrt{100}} = 0.1$



b) Construct the confidence interval for your test.

Lower Bound: 7.7

Upper Bound: 8.3

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

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

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.

Given that Students Sleep on average 7.8 hours per night, there is a probability of 12% that a student will sleep 7.8 hours or more

Name: Luke Thompson

Student ID: U652176

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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

$$\frac{1.5}{\sqrt{1}} = 1.5$$

Mean: 8

Standard error: .15

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

Shape: Exponential

$$\frac{1.5}{\sqrt{36}} = \frac{1.5}{6}$$

Mean: 8

Standard error: .15

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

Shape: Exponential

$$\frac{1.5}{\sqrt{100}} = .15$$

Mean: 8

Standard error: .15

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

Mean: 8

$$\frac{1.5}{\sqrt{64}} = \frac{1.5}{8}$$

Standard error: .1875

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

- 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: Approx Normal

$$\frac{1}{\sqrt{100}}$$

Mean: 8

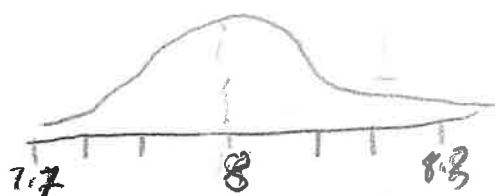
Standard error: .1

b) Construct the confidence interval for your test.

Lower Bound: 7.7

Upper Bound: 8.3

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



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

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.

Based on his test there is a 12% chance of his data happening if this was the true relationship, this is not significant on a 90% test.

Name: Cooper Sainah

Student ID: 4543832

ECON 0150 | MiniExam 3 | Fall 2025

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I I will not communicate directly or indirectly with others during the MiniExam.

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.

CLT for most dist. sampling creates a normal shape

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

Shape: Uniform

Mean: 8

Standard error: 1.5 $SE = \frac{\sigma}{\sqrt{n}}$

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

Shape: Approx. normal

Mean: 8

Standard error: 1.5/6

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

Shape: Approx. normal (more normal than n=36)

Mean: 8

Standard error: 1.5/10 or .015

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

Mean: 8

Standard error: $\frac{1.5}{\sqrt{64}}$

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

- The sample mean will equal the population mean when n is large enough
↳ not exactly
- The individual data points in a sample will follow a normal distribution
↳ individual points are uniform, they're normal if together
- The distribution of sample means will approach a normal distribution
- The population distribution must be normal for the theorem to apply → not how the theorem works

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: Approx. normal

Mean: 8

Standard error: $\frac{1}{10}$ or .1

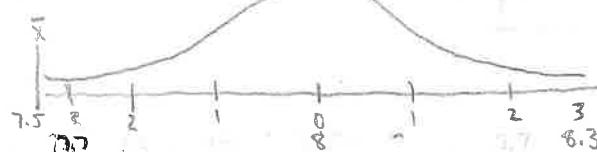
b) Construct the confidence interval for your test. $[7.8 \pm .3]$

Lower Bound: 7.7

Upper Bound: 8.3

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

t-dist: centred on \bar{x}



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

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.

If students sleep on average 7.8 hours per night, we'd observe a difference of 7.8 hours or more extreme 12% of the time.

Name: Absar Mostafa

Student ID: 463710

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We know population

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: Uniform Mean: 8 Standard error: 1.5

$$\frac{1.5}{\sqrt{1}} = 1.5$$

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

Shape: approx. normal Mean: 8 Standard error: 0.75

$$\frac{1.5}{\sqrt{36}} = \frac{1.5}{6} = \frac{1}{4}$$

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

Shape: Normal Mean: 8 Standard error: 0.15

$$\frac{1.5}{\sqrt{100}} = \frac{1.5}{10} = 0.15$$

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: Normal

$$\frac{1.5}{\sqrt{64}} = \frac{1.5}{8} = \frac{3}{16}$$

Mean: 8

Standard error: $3/16$

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
- 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-distribution

$$\frac{1}{\sqrt{100}} = \frac{1}{10}$$

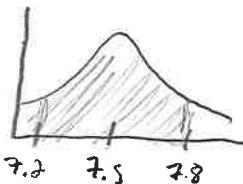
Mean: 7.5

Standard error: 0.10

b) Construct the confidence interval for your test.

Lower Bound: 7.2 hours Upper Bound: 7.8 hours

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



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

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.

Assuming students sleep 7.8 hours/night, the probability of getting a sample as extreme or more extreme than our sample is 0.12.

Name: Emily Rod

Student ID: car113 ... 2093

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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: exp nential

Mean: 8

Standard error: $\frac{1.5}{\sqrt{1}}$ = 1.5

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

Shape: approx normal $n > 30$ CLT

Mean: 8

Standard error: $1.5/\sqrt{36} = 1.5/6 = 3/12 = 1/4$

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

Shape: approx normal $n > 50$ CLT

Mean: 8

Standard error: $1.5/\sqrt{100} = 1.5/10 = .15$

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:

$n > 30$ CLT

Shape: approx normal

Mean: 8

Standard error: $\frac{1.5}{\sqrt{64}} = \frac{1.5}{8} = \frac{3}{16}$

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

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: dist

Mean: $\mu_0 = 8$ $\bar{x} = 7.5$

Standard error: $\frac{1}{\sqrt{100}} = \frac{1}{10}$

b) Construct the confidence interval for your test.

Lower Bound: 7.7

Upper Bound: 8.3

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



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

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.

a value more extreme than

1.2% of students will sleep more than 7.8 hours/night if randomly selected

Name: Lukas Jones

Student ID: CAJ 116

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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

Mean: 8

Standard error: 1.5

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

Shape: Approx. Normal

Mean: 8

Standard error: $\frac{1.5}{\sqrt{36}} = \frac{1.5}{6} = \frac{1}{4}$

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

Shape: Approx. Normal

Mean: 8

Standard error: $\frac{1.5}{\sqrt{100}} = \frac{1.5}{10}$

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

Mean: 8

$$\text{Standard error: } \frac{1.5}{\sqrt{64}} = \frac{1.5}{8}$$

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
- 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: Approx Normal

Mean: 7.5

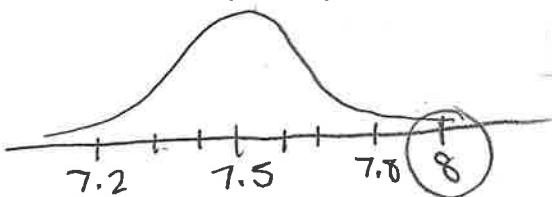
$$\text{Standard error: } \frac{1}{\sqrt{100}} = \frac{1}{10}$$

b) Construct the confidence interval for your test.

Lower Bound: 7.2

Upper Bound: 7.8

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



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

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.

Assuming we fail to reject the null hypothesis, there is a 0.12 probability of getting values more or less extreme than the ones we have

Name: Kyle Reardon

Student ID: 4626331

ECON 0150 | MiniExam 3 | Fall 2025

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KR I will not communicate directly or indirectly with others during the MiniExam.

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: Uniform

Mean: 8

Standard error: 1.5

$$SE = \frac{\sigma}{\sqrt{n}} = \frac{1.5}{\sqrt{1}} = 1.5$$

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

Shape: Exponential

Mean: 8

Standard error: 1/4

$$SE = \frac{1.5}{\sqrt{36}} = \frac{1.5}{6} = \frac{1}{4}$$

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

Shape: Exponential

Mean: 8

Standard error: 3/20

$$SE = \frac{1.5}{\sqrt{100}} = \frac{1.5}{10} = \frac{3}{20}$$

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: approximately normal

$$SE = \frac{1.5}{\sqrt{64}} = \frac{1.5}{8} = \frac{3}{16}$$

Mean: 8

Standard error: $\frac{3}{16}$

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
- 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.

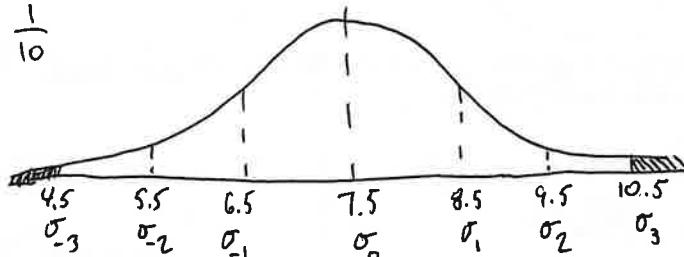
a) Describe the sampling distribution.

Shape: approximately normal

$$SE = \frac{1}{\sqrt{100}} = \frac{1}{10}$$

Mean: 7.5

Standard error: $\frac{1}{10}$

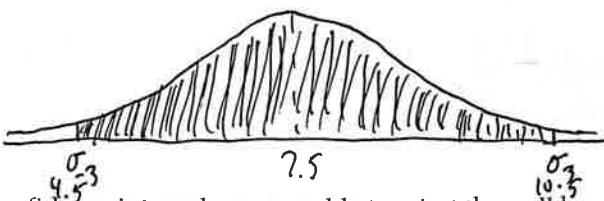


b) Construct the confidence interval for your test.

Lower Bound: 4.5

Upper Bound: 10.5

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



d) Using this confidence interval, are you able to reject the null hypothesis?

YES NO

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.

This means that there is a 12% chance that the result is in the confidence interval if a student sleeps 7.8 hours per night.

Name: Daniel Harrel

Student ID: 4613422

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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: Uniform

Mean: 8

Standard error: .15

$$SE = \frac{\sigma}{\sqrt{n}} = \frac{1.5}{\sqrt{1}} = 1.5$$

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

Shape: Exponential

Mean: 8

Standard error: 0.25

$$\frac{1.5}{\sqrt{36}} = \frac{1.5}{6} = \frac{3}{12} = \frac{1}{4}$$

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

Shape: Exponential

Mean: 8

Standard error: 0.15

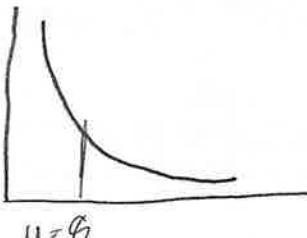
$$\frac{1.5}{\sqrt{100}} = 0.15$$

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

multiple samples



$$\frac{1.5}{\sqrt{64}} = \frac{1.5}{8} = \frac{3}{16}$$

Mean: 8

Standard error: $\frac{3}{16}$

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

- The sample mean will equal the population mean when n is large enough \times
- The individual data points in a sample will follow a normal distribution
- The distribution of sample means will approach a normal distribution
- The population distribution must be normal for the theorem to apply \times

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: Approx. Normal

$$\mu_0 = 8$$

Mean: 7.5

$$n = 100$$

Standard error: $\frac{1}{10}$

$$\bar{x} = 7.5$$

$$S = 1$$

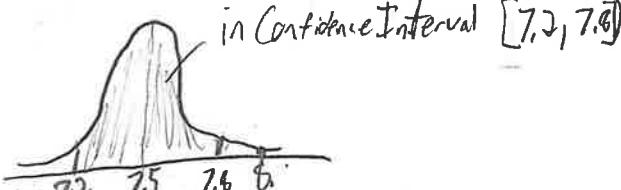
$$SE = \frac{1}{\sqrt{100}} = \frac{1}{10}$$

- b) Construct the confidence interval for your test.

$$\text{Lower Bound: } 7.5 - \frac{3}{10} = 7.2$$

$$\text{Upper Bound: } 7.5 + \frac{3}{10} = 7.8$$

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



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

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.

If students sleep ^{on average} 7.6 hrs per night, there is a 12% chance that the result we get is within the Confidence Interval

from a
sample

Name: Wilberg Allen

Student ID: 4571386

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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

1.5/1

Mean: 8

Standard error: 1.5

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

Shape: Approx. normal

Mean: 8

Standard error: 1.5/6

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

Shape: Approx. normal

Mean: 8

Standard error: 1.5/10

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

Mean: 8

1.5

Standard error: $\frac{1.5}{\sqrt{64}}$

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

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: Approx. normal

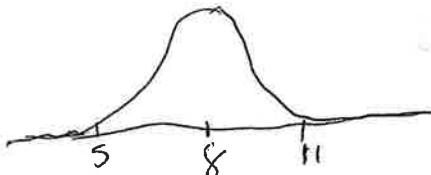
Mean: 7.5

Standard error: $\frac{1}{\sqrt{100}}$

b) Construct the confidence interval for your test.

Lower Bound: ~~5.5, 8.5~~ (5, 8) Upper Bound: (8, 11)

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



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

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.

12% of the time we observe an extreme case

Name: Joseph Corella

Student ID: 4515970

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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: Uniform

Mean: 8

Standard error: 1.5

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

Shape: approx. normal

Mean: 8

Standard error: $1.5/\sqrt{36} = 1.5/6$

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

Shape: normal

Mean: 8

Standard error: $1.5/\sqrt{100}$

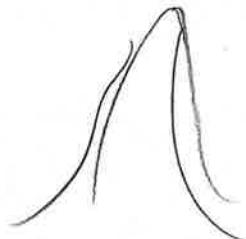
Q2. You take 1000 samples ($n = 64$) of classes, each with sleep times following an *exponential* distribution with mean (μ) of 8 hours and standard deviation (σ) of 1.5 hours (same as in Q1).

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: expon.

Mean: 8

Standard error: $1.5/\sqrt{64}$



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
- 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.

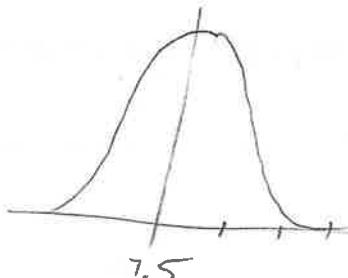
a) Describe the sampling distribution.

Shape: t-distro

\bar{x}/\sqrt{n}

Mean: 7.5

Standard error: $1/\sqrt{100}$

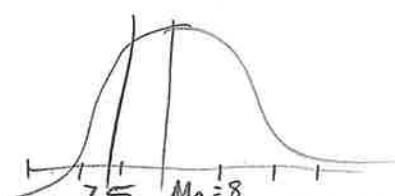


b) Construct the confidence interval for your test.

Lower Bound: $7.5 - 3SE$

Upper Bound: $7.5 + 3SE$

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



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

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.

There is a 12% chance that we are more likely to observe an extreme sample.

Name: Lucas Nakamura

Student ID: 4491851

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LN I will not communicate directly or indirectly with others during the MiniExam.

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: uniformal

Mean: 8

Standard error: 1.5

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

Shape: approx exponential

Mean: 8

Standard error: 1/4

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

Shape: expnential

Mean: 8

Standard error: .15

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: exponential

Mean: 8

Standard error: $\frac{1.5}{\sqrt{64}}$

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

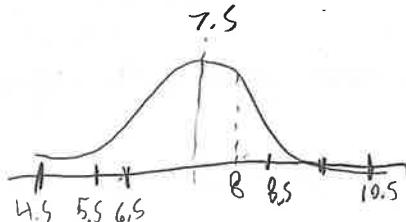
Q3. You are interested in whether students sleep on average 8 hours per night. You take one sample of 100 students ($n = 100$) with an average sleep time (\bar{x}) of 7.5 hours and standard deviation (S) of 1. You have decided in advance to reject the null hypothesis if it lies 3 standard errors away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

a) Describe the sampling distribution.

Shape: approx normal

Mean: 7.5

Standard error: $\frac{1}{\sqrt{100}} = 0.1$

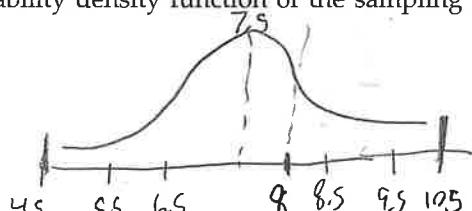


b) Construct the confidence interval for your test.

Lower Bound: 4.5

Upper Bound: 10.5

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



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

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.

IT means that the mean of 7.8 hours is wrong ! 2% off the time

Name: Matan Cohen

Student ID: 4631169

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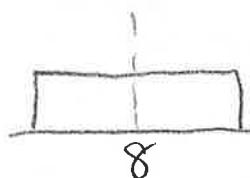
Q1. A class's average sleep time follows an *exponential distribution* with mean (μ) of 8 hours and standard deviation (σ) of 1.5 hours.

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

Shape: Uniform

Mean: 8

Standard error: 1.5



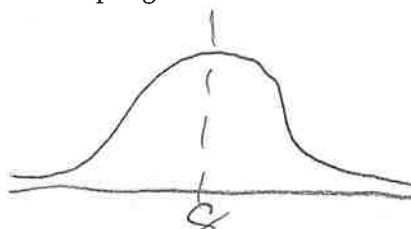
$$SE = \frac{\sigma}{\sqrt{n}} = \frac{1.5}{\sqrt{1}}$$

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

Shape: Approaching Normal

Mean: 8

Standard error: 1/4



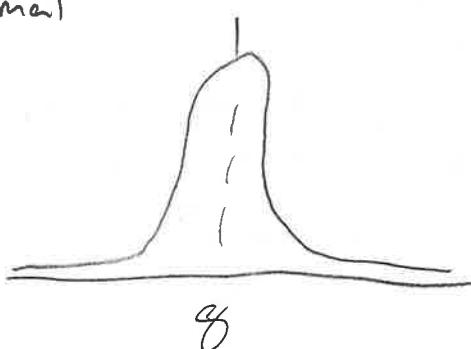
$$\frac{1.5}{\sqrt{36}} = \frac{1.5}{6} = \frac{1}{4}$$

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

Shape: Even closer to Normal

Mean: 8

Standard error: 1/10



$$\frac{1.5}{\sqrt{100}} = \frac{1.5}{10}$$

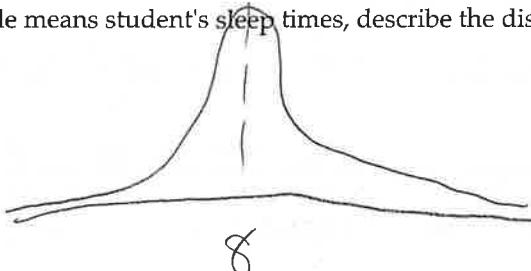
Q2. You take 1000 samples ($n = 64$) of classes, each with sleep times following an *exponential* distribution with mean (μ) of 8 hours and standard deviation (σ) of 1.5 hours (same as in Q1).

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: Normal (almost)

Mean: 8

Standard error: $\frac{1.5}{\sqrt{64}} = \frac{1.5}{8}$



$$\frac{1.5}{\sqrt{64}} = \frac{1.5}{8}$$

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

- The sample mean will equal the population mean when n is large enough \times
- The individual data points in a sample will follow a normal distribution \times
- The distribution of sample means will approach a normal distribution \checkmark
- The population distribution must be normal for the theorem to apply \times

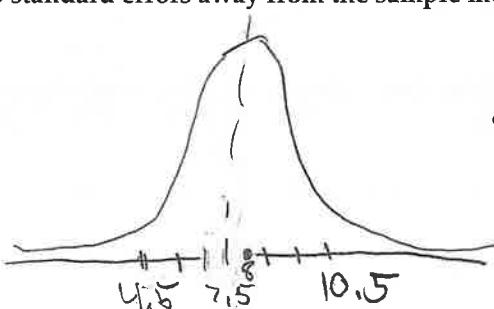
Q3. You are interested in whether students sleep on average 8 hours per night. You take one sample of 100 students ($n = 100$) with an average sleep time (\bar{x}) of 7.5 hours and standard deviation (S) of 1. You have decided in advance to reject the null hypothesis if it lies 3 standard errors away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

a) Describe the sampling distribution.

Shape: Bell curve

Mean: 7.5

Standard error: $\frac{1}{\sqrt{100}} = \frac{1}{10}$

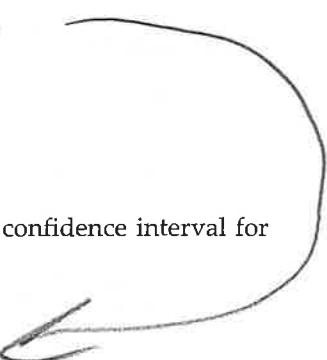


$$\frac{1}{\sqrt{100}} = \frac{1}{10}$$

b) Construct the confidence interval for your test.

Lower Bound: 4.5

Upper Bound: 10.5



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

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

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.

This p-value means there is a 12% of observing a mean as extreme or more extreme than the one they observe, considering that the null hypothesis (mean = 7.8 hours) is true.

Name: James Sampugnaro

Student ID: 4569386

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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: Uniform

$$\frac{1.5}{1}$$

Mean: 8

Standard error: 1.5

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

Shape: approx. normal

$$\frac{1.5}{\sqrt{36}} \quad \frac{1.5}{6}$$

Mean: 8

Standard error: 1.5/6

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

Shape: approx. normal (more smaller)

Mean: 8

Standard error: 1.5 / 10

$$\frac{1.5}{\sqrt{100}} \quad \frac{1.5}{10}$$

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).

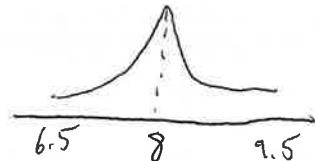
a) If you were to plot a histogram of the sample means student's sleep times, describe the distribution you would expect to see:

$$n=64 \quad \sigma = 1.5$$

Shape: approx. normal

Mean: 8 1.5

Standard error: 8



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

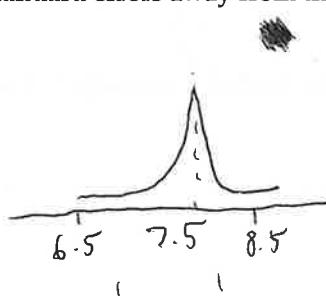
Q3. You are interested in whether students sleep on average 8 hours per night. You take one sample of 100 students ($n = 100$) with an average sleep time (\bar{x}) of 7.5 hours and standard deviation (S) of 1. You have decided in advance to reject the null hypothesis if it lies 3 standard errors away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

a) Describe the sampling distribution.

Shape: approx. normal

Mean: 7.5

Standard error: 1/10

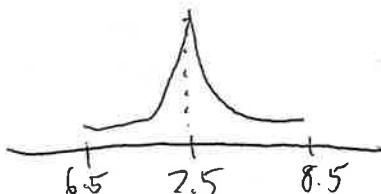


b) Construct the confidence interval for your test.

Lower Bound: 6.5

Upper Bound: 8.5

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



d) Using this confidence interval, are you able to reject the null hypothesis?

YES / NO

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.

This p-value means it is with 88% confidence

Name: Uso-Sophia Kachalava

Student ID: 4818143

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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

Mean: 8 hrs

Standard error: 1.5 hrs $\frac{1.5}{\sqrt{n}} = 1.5$

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

Shape: approx normal

Mean: 8 hrs $\frac{1.5}{\sqrt{36}} = 0.25$

Standard error: 0.25 hrs

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

Shape: normal

Mean: 8 hrs

Standard error: 0.15 hrs $\frac{1.5}{\sqrt{100}} = 0.15$

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: normal

Mean: 8 hours

Standard error: 0.1875

$$\frac{1.5}{\sqrt{64}} \leftarrow 0.1875$$

- 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

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

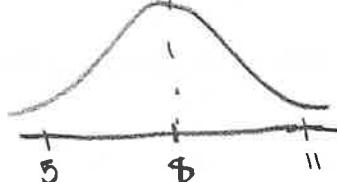
Q3. You are interested in whether students sleep on average 8 hours per night. You take one sample of 100 students ($n = 100$) with an average sleep time (\bar{x}) of 7.5 hours and standard deviation (S) of 1. You have decided in advance to reject the null hypothesis if it lies 3 standard errors away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

- a) Describe the sampling distribution.

Shape: normal

Mean: 7.5 hours

Standard error: 0.1



$$\frac{1}{\sqrt{100}} = 0.1$$

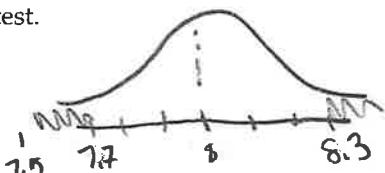
$$t = \frac{7.5 - 8}{0.1} = -\frac{0.5}{0.1} = -5$$

- b) Construct the confidence interval for your test.

Lower Bound: 7.3

Upper Bound: 8.3

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



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

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.

Since our p-value is $0.12 > 0.05$ is large, it indicates that our observed result is unlikely if the null hypothesis is true so we fail to reject the H_0 .

Name: SAAVI SAKHUSA

Student ID: 4737248

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S.S.

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: uniform

Mean: 8 hours

Standard error: $\Rightarrow \frac{\sigma}{\sqrt{n}} \Rightarrow \frac{1.5}{\sqrt{1}} = \boxed{\frac{1.5}{1}} \Rightarrow \boxed{1.5}$

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

Shape: approx normal \rightarrow (the n size increased)

Mean: 8

Standard error: $\frac{\sigma}{\sqrt{n}} = \frac{1.5}{\sqrt{36}} \Rightarrow \frac{1.5}{6}$

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

Shape: normal

Mean: 8

Standard error: $\frac{1.5}{\sqrt{100}} = \frac{1.5}{10} = \boxed{\frac{1.5}{10}} = \frac{1.5}{100} \Rightarrow \boxed{0.15}$

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: normal

Mean: 8

$$\text{Standard error: } \frac{1.5}{\sqrt{64}} = \frac{1.5}{8}$$

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

- The sample mean will equal the population mean when n is large enough \approx
- The individual data points in a sample will follow a normal distribution α ch.
- The distribution of sample means will approach a normal distribution
- 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: normal

Mean: 8 (μ)

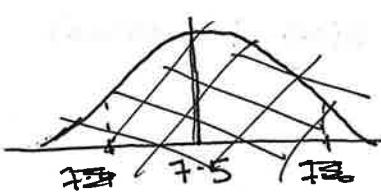
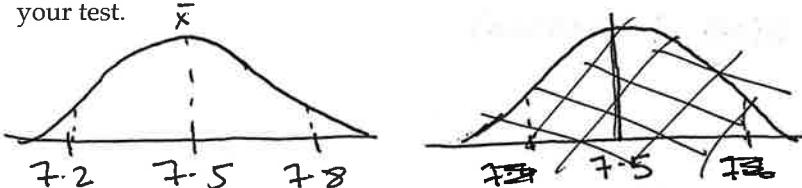
$$\text{Standard error: } \frac{1}{\sqrt{100}} = \frac{1}{10} = \boxed{0.1}$$

b) Construct the confidence interval for your test.

Lower Bound: ~~7.2~~ 7.2

Upper Bound: ~~7.8~~ 7.8

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



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

value = 8. 7.2; 7.8
8 outside ~~7.2; 7.8~~
~~reject~~

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 here means there is a 12% ~~probability~~ of getting a sample result which is extreme as what we observe (if the null hypothesis were true.)

Name: Luke Brennfleck

Student ID: 4614978

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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

Mean: 8

$$\text{Standard error: } \frac{1.5}{\sqrt{n}} = \frac{1.5}{\sqrt{1}} = 1.5$$

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

Shape: approx. normal (more normal than a due to CLT)

Mean: 8

$$\text{Standard error: } 0.25 \frac{1.5}{\sqrt{36}} = \frac{1.5}{6}$$

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

Shape: approx. normal (more normal than b due to CLT)

Mean: 8

$$\text{Standard error: } 0.15 \frac{1.5}{\sqrt{100}} = \frac{1.5}{10}$$

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

Mean: 8

Standard error: $0.1875 \frac{\sigma}{\sqrt{n}} = \frac{1.5}{\sqrt{64}} = \frac{1.5}{8}$

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

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: approx. normal

Mean: 7.5

Standard error: $0.1 \frac{S}{\sqrt{n}} = \frac{1}{\sqrt{100}} = \frac{1}{10}$

b) Construct the confidence interval for your test.

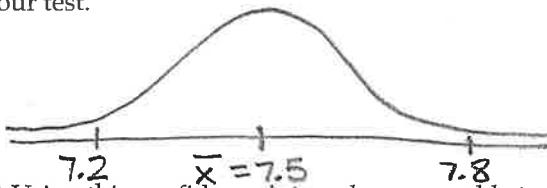
Lower Bound: 7.2

$7.5 - 3(0.1)$

Upper Bound: 7.8

$7.5 + 3(0.1)$

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



d) Using this confidence interval, are you able to reject the null hypothesis?

YES / NO

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.

Assuming that students do in fact sleep on average 7.8 per night, the probability that a given value is as extreme or more extreme than this is 0.12.

Name: Isabella Ortega

Student ID: 4653919

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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

Mean: 8 hours

Standard error: 1.5 hours

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

Shape: approximately normal

Mean: 8 hours

Standard error: 0.25 hours

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

Shape: approximately normal

Mean: 8 hours

Standard error: 0.15 hours

$$SE = \frac{1.5}{\sqrt{36}} = \frac{1.5}{6}$$

$$\frac{1.5}{\sqrt{100}} = \frac{1.5}{10}$$

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: approximately normal

Mean: 8 hours

$$\frac{1.5}{8} = 0.1875$$

Standard error: 0.1875 hours

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

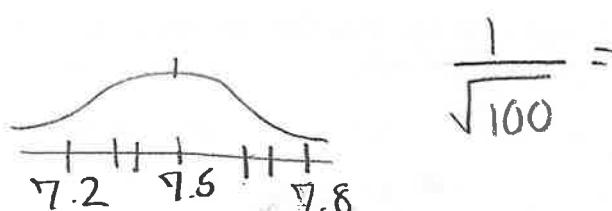
Q3. You are interested in whether students sleep on average 8 hours per night. You take one sample of 100 students ($n = 100$) with an average sleep time (\bar{x}) of 7.5 hours and standard deviation (S) of 1. You have decided in advance to reject the null hypothesis if it lies 3 standard errors away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

a) Describe the sampling distribution.

Shape: approx. normal

Mean: 8

Standard error: 0.10



$$\frac{1}{\sqrt{100}} =$$

b) Construct the confidence interval for your test.

Lower Bound: 7.2

Upper Bound: 7.8

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

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

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.

There is a probability of 0.12 that we observe results as extreme as 7.8 hours of sleep per night

↓
or a difference is

Name: Ty Serakowski

Student ID: 4643653

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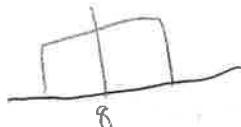
Q1. A class's average sleep time follows an *exponential distribution* with mean (μ) of 8 hours and standard deviation (σ) of 1.5 hours.

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

Shape: Uniform

Mean: 8

Standard error: 1.5



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

Shape: Approx normal

Mean: 8

Standard error: $\frac{1.5}{\sqrt{36}} = \frac{1.5}{6}$

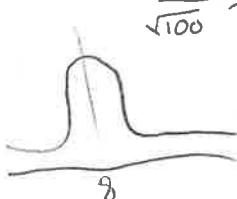


c) If you sample one student ($n = 100$), what is the sampling distribution of the sample mean?

Shape: Approx normal

Mean: 8

Standard error: $\frac{1.5}{\sqrt{100}} = \frac{1.5}{10}$

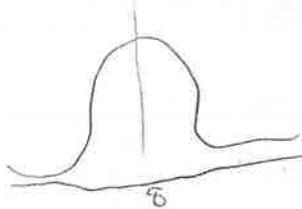


Q2. You take 1000 samples ($n = 64$) of classes, each with sleep times following an *exponential* distribution with mean (μ) of 8 hours and standard deviation (σ) of 1.5 hours (same as in Q1).

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

$$\frac{1.5}{\sqrt{64}} = \frac{1.5}{8}$$



Mean: 8

Standard error: $\frac{1.5}{8}$

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
- 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.

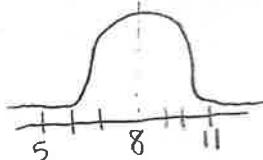
a) Describe the sampling distribution.

$$\frac{1}{\sqrt{100}} = \frac{1}{10}$$

Shape: approx normal

Mean: 7.5

Standard error: $\frac{1}{10}$

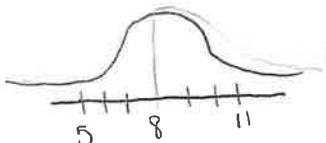


b) Construct the confidence interval for your test.

Lower Bound: 5

Upper Bound: 11

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



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

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.

If Students truly don't sleep on avg for 8 hrs, they'd sleep for 7.8 hours or more extreme 12% of the time

Name: Alex Paluso

Student ID: 4648164

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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: Uniform

Mean: 8

Standard error: $\sqrt{1.5}$

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

Shape: Aprox. Normal

Mean: 8

Standard error: $\frac{1.5}{\sqrt{36}}$

$$\frac{1.5}{\sqrt{36}} = \frac{1.5}{6}$$

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

Shape: Aprox. Normal

Mean: 8

Standard error: $\frac{1.5}{\sqrt{100}}$

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

Mean: 8 $\frac{1.5}{\sqrt{64}}$
Standard error: $\frac{1.5}{\sqrt{64}}$

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

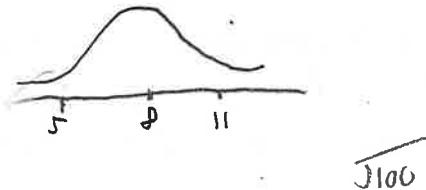
- The sample mean will equal the population mean when n is large enough
- The individual data points in a sample will follow a normal distribution
- The distribution of sample means will approach a normal distribution
- The population distribution must be normal for the theorem to apply

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: Approx norm

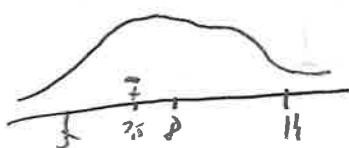
Mean: 8
Standard error: $\frac{1}{\sqrt{100}}$



b) Construct the confidence interval for your test.

Lower Bound: 5 Upper Bound: 11

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



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

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.

If the students didn't get around the average sleep time we would observe a difference of 7.8 hours or more extreme 12% of the time

Name: David Perkins

Student ID: 4711921

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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

Mean: 8

Standard error: $\frac{1.5}{\sqrt{1}}$ 1.5

$$\frac{1.5}{\sqrt{n}} = \frac{1.5}{\sqrt{1}} = 1.5$$

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

Shape: Exponential

Mean: 8

Standard error: $\frac{1.5}{\sqrt{36}}$ $\frac{1.5}{6}$

$$\frac{1.5}{\sqrt{36}} = \frac{1.5}{6} = \frac{1}{4}$$

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

Shape: Exponential

Mean: 8

Standard error: $\frac{1.5}{\sqrt{100}}$ $\frac{1.5}{10}$

$$\frac{1.5}{\sqrt{100}} = \frac{1.5}{10}$$

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

Mean: 8

Standard error: $\frac{1.5}{\sqrt{64}} = \frac{1.5}{8}$

$$\frac{1.5}{\sqrt{64}} = \frac{1.5}{8}$$

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

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: approx. normal

Mean: 7.5

Standard error: $\frac{1}{\sqrt{100}} = \frac{1}{10}$

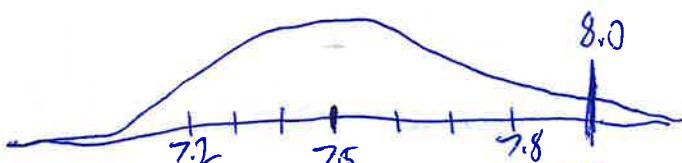
$$\frac{1}{\sqrt{100}} = \frac{1}{10}$$

b) Construct the confidence interval for your test.

Lower Bound: 7.2

Upper Bound: 7.8

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



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

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.

Given the p-value there is a 12% chance to see this value or more extreme given the null hypothesis.

12% chance to see this value or more extreme given the null hypothesis.

Name: Dylan Jones

Student ID: 4647848

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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

$$\frac{1.5}{\sqrt{1}}$$

Mean: 8 hours

Standard error: 1.5 hours

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

Shape: approximately normal

Mean: 8

$$\frac{1.5}{\sqrt{36}} = \frac{1.5}{6}$$

Standard error: 1/4 or 0.25 hours

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

Shape: normal

Mean: 8 hours

$$\frac{1.5}{\sqrt{100}} = \frac{1.5}{10}$$

Standard error: 0.15 hours

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: normal (CLT)

$$\frac{1.5}{\sqrt{64}} = \frac{1.5}{8} = 0.1875$$

Mean: 8

Standard error: 0.1875 hours

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
- 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-distribution

$$\frac{1}{\sqrt{100}} = \frac{1}{10}$$

Mean: 7.5 hours

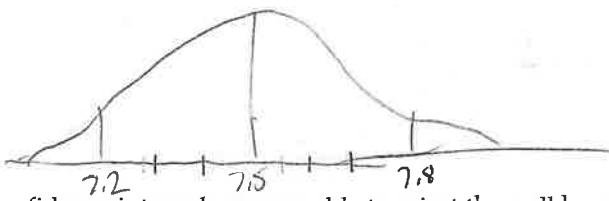
Standard error: 1/10 or 0.1 hours

b) Construct the confidence interval for your test.

Lower Bound: 7.2 hours

Upper Bound: 7.8 hours

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



d) Using this confidence interval, are you able to reject the null hypothesis?

YES / NO

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.

If the null hypothesis is true, we can expect a 12% probability of obtaining a sample within its extremity. 12% of the time