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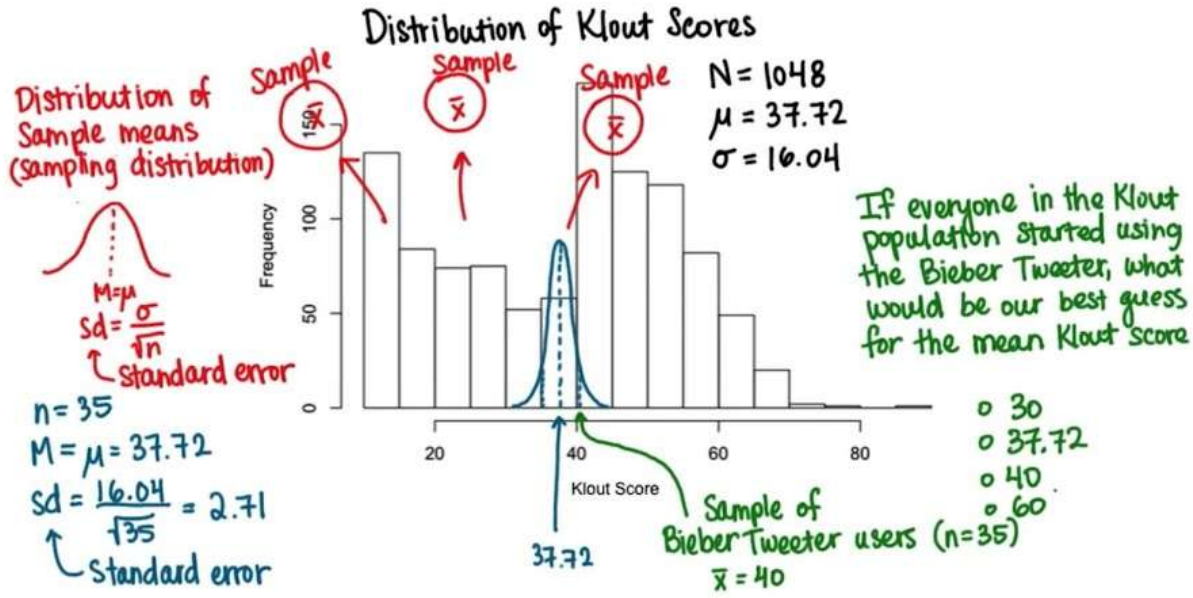
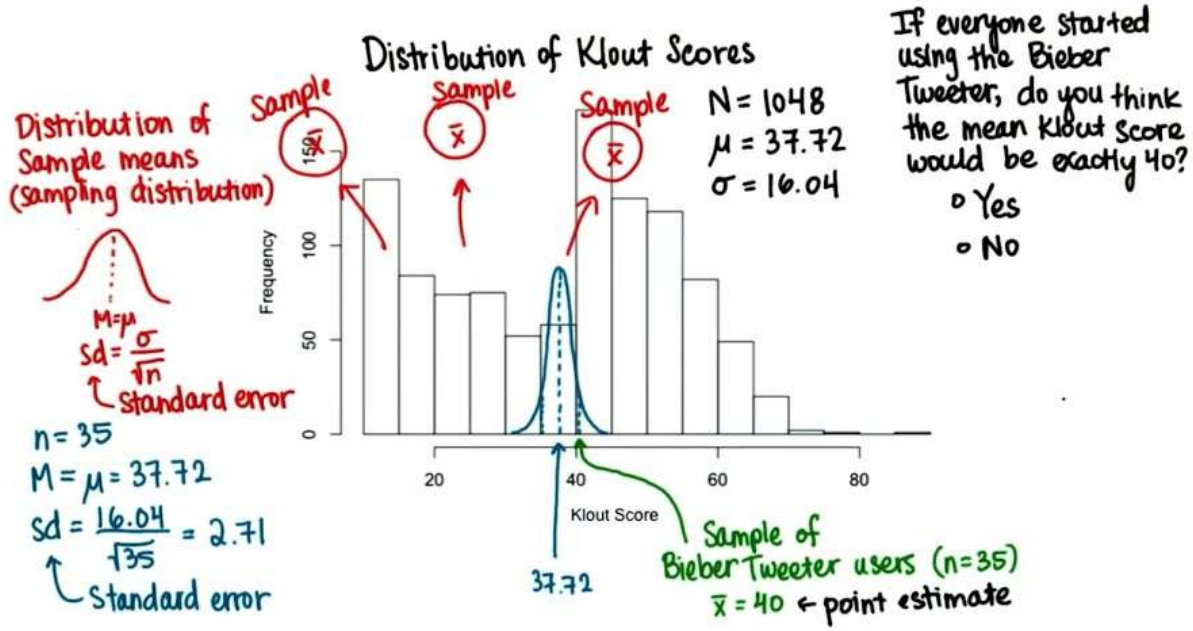
Notes for Students – Lesson 8

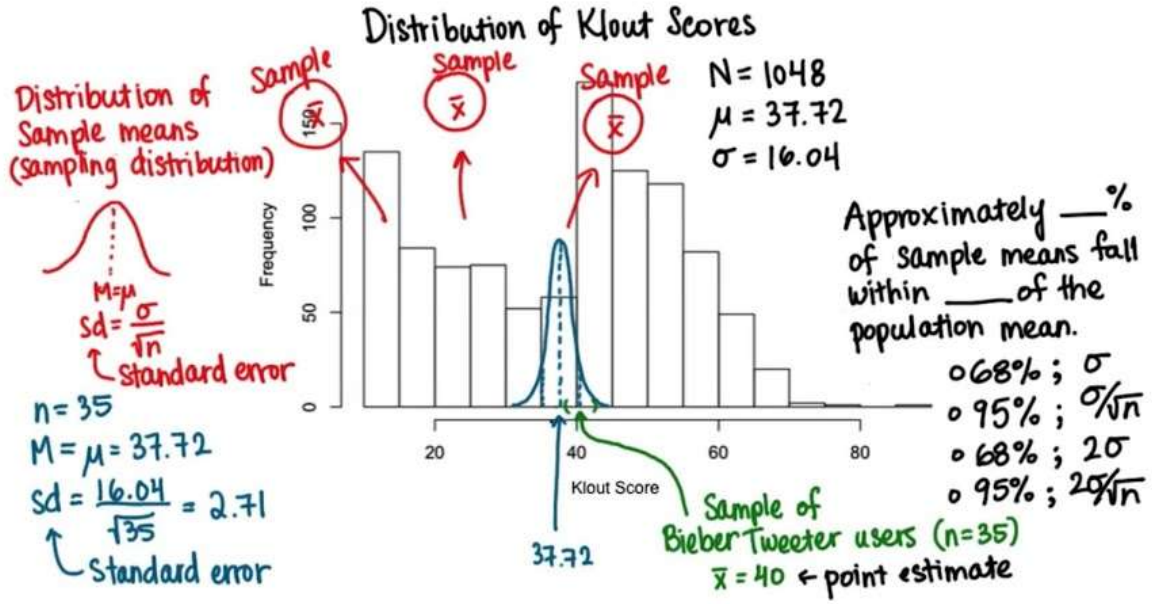
Q1:-



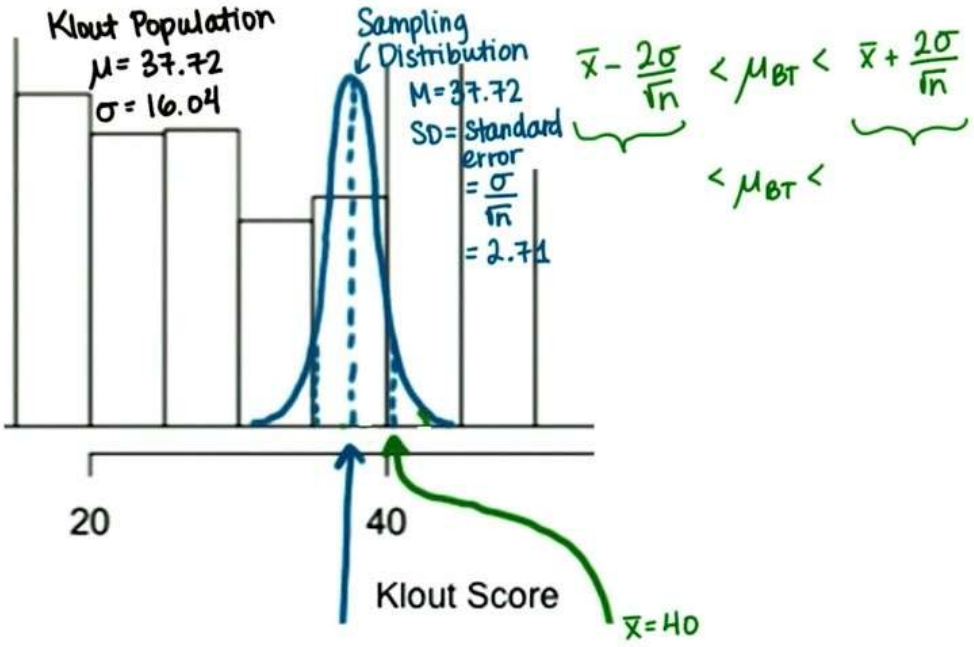
Q2:-



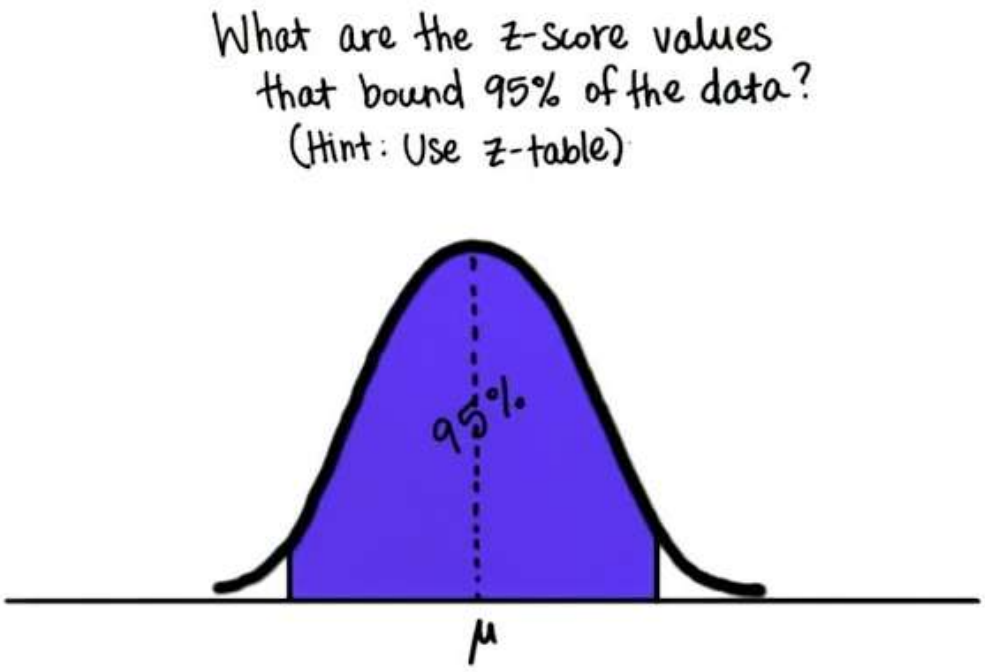
Q3:-


Distribution of Klout Scores
Distribution of Sample means (sampling distribution)
Sample
Sample
Sample
N = 1048
μ = 37.72
σ = 16.04
Frequency
0
50
100
150
20
40
60
80
Klout Score
37.72
M = μ
sd = σ/√n
Standard error
n = 35
M = μ = 37.72
sd = 16.04/√35 = 2.71
Standard error
Approximately ___% of sample means fall within ___ of the population mean.
68% ; σ
95% ; σ/√n
68% ; 2σ
95% ; 2σ/√n
Sample of Bieber Tweeter users (n=35)
x̄ = 40 ← point estimate

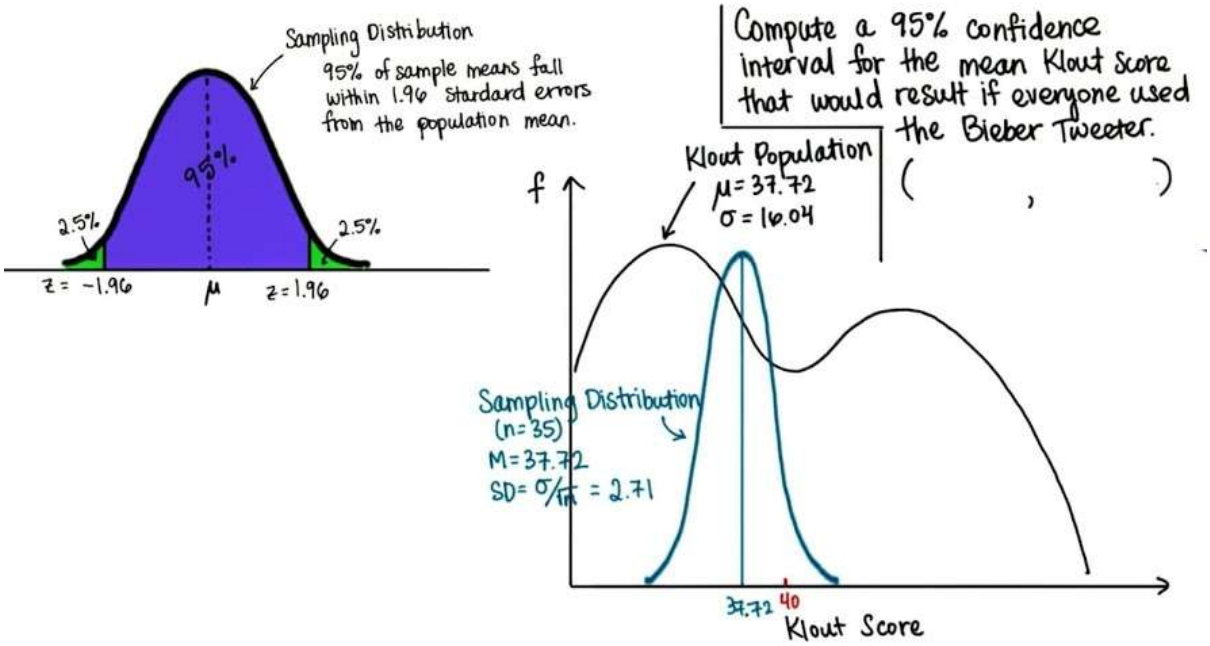
Q4:-


Klout Population
μ = 37.72
σ = 16.04
Sampling Distribution
M = 37.72
SD = Standard error = σ/√n = 2.71
x̄ − 2σ/√n < μBT < x̄ + 2σ/√n
< μBT <
20
40
Klout Score
x̄ = 40

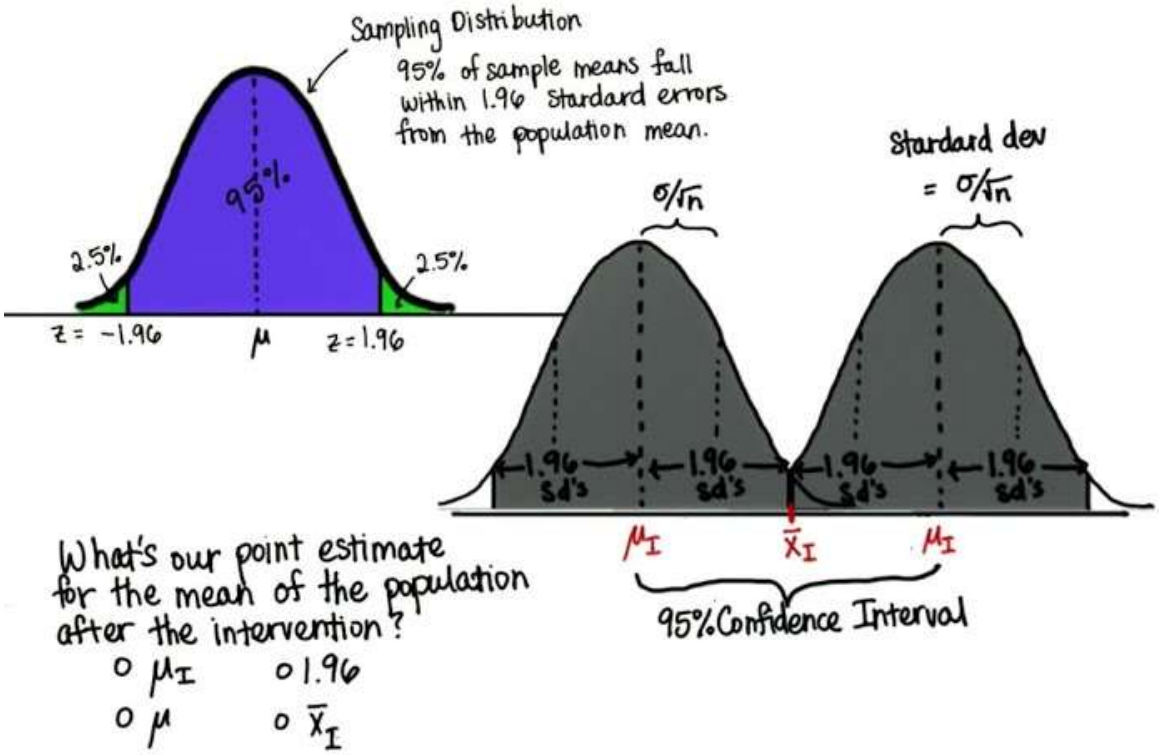
Q5:-


What are the z-score values that bound 95% of the data? (Hint: Use z-table)
95%
μ

Q6:-


Sampling Distribution
95% of sample means fall within 1.96 standard errors from the population mean.
95%
2.5%
2.5%
z = -1.96
μ
z = 1.96
Compute a 95% confidence interval for the mean Klout score that would result if everyone used the Bieber Tweeter.
(,)
f
Klout Population
μ = 37.72
σ = 16.04
Sampling Distribution
(n = 35)
M = 37.72
SD = σ/√n = 2.71
37.72
40
Klout Score

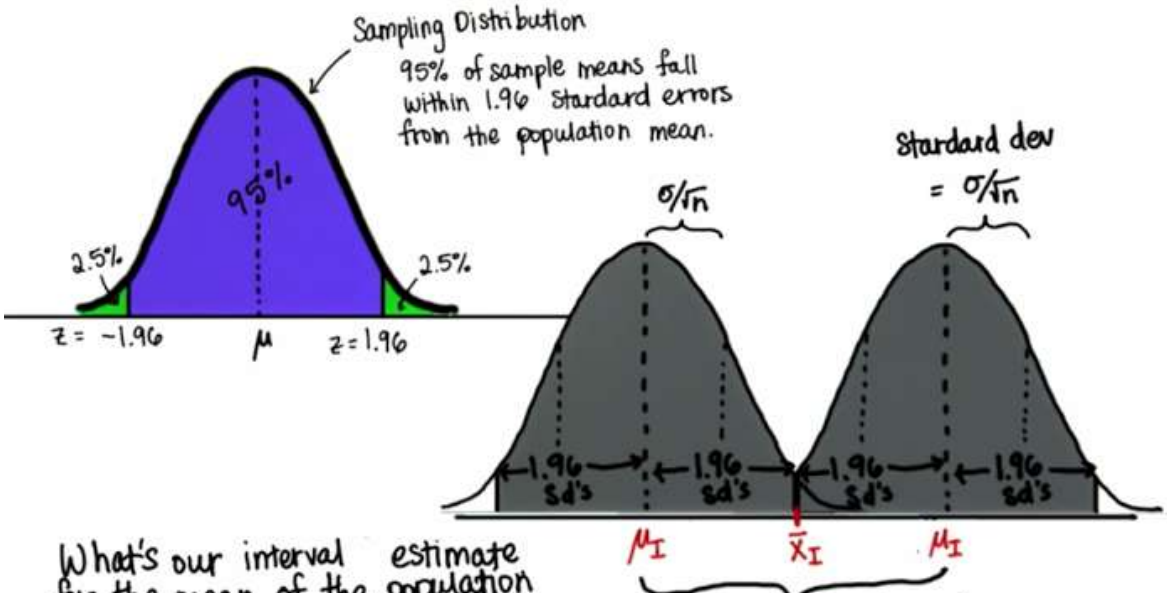
Q7:-



What's our point estimate for the mean of the population after the intervention?

- o μ_I
- o 1.96
- o μ
- o $\bar{x}_I$

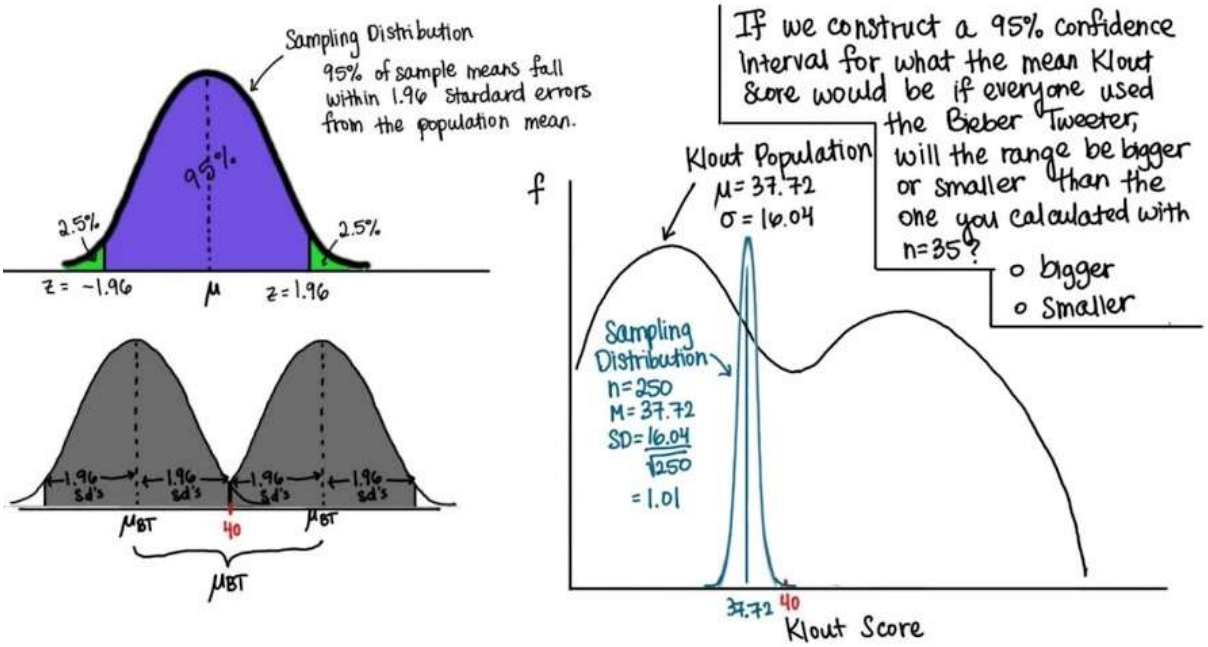
Q8:-



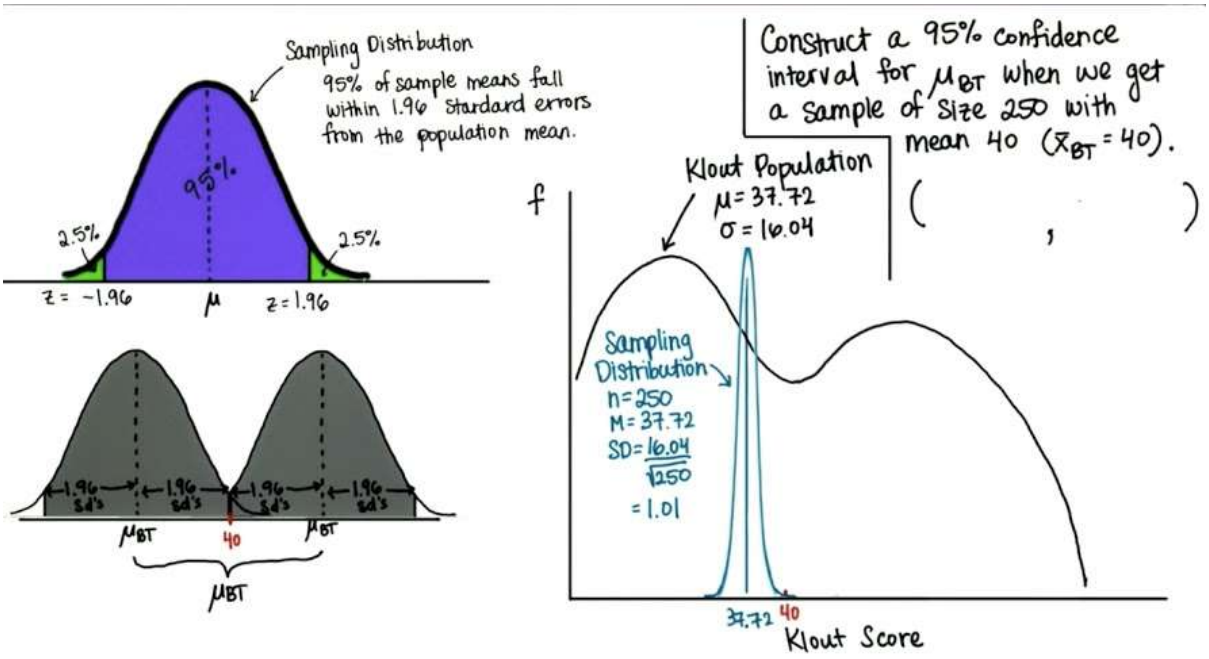
What's our interval estimate for the mean of the population after the intervention?

- o $\mu + 1.96$
- o $(\mu - 1.96, \mu + 1.96)$
- o $\left(\bar{x}_I - 1.96\frac{\sigma}{\sqrt{n}}, \bar{x}_I + 1.96\frac{\sigma}{\sqrt{n}}\right)$
- o $\left(\mu_I - 1.96\frac{\sigma}{\sqrt{n}}, \mu_I + 1.96\frac{\sigma}{\sqrt{n}}\right)$

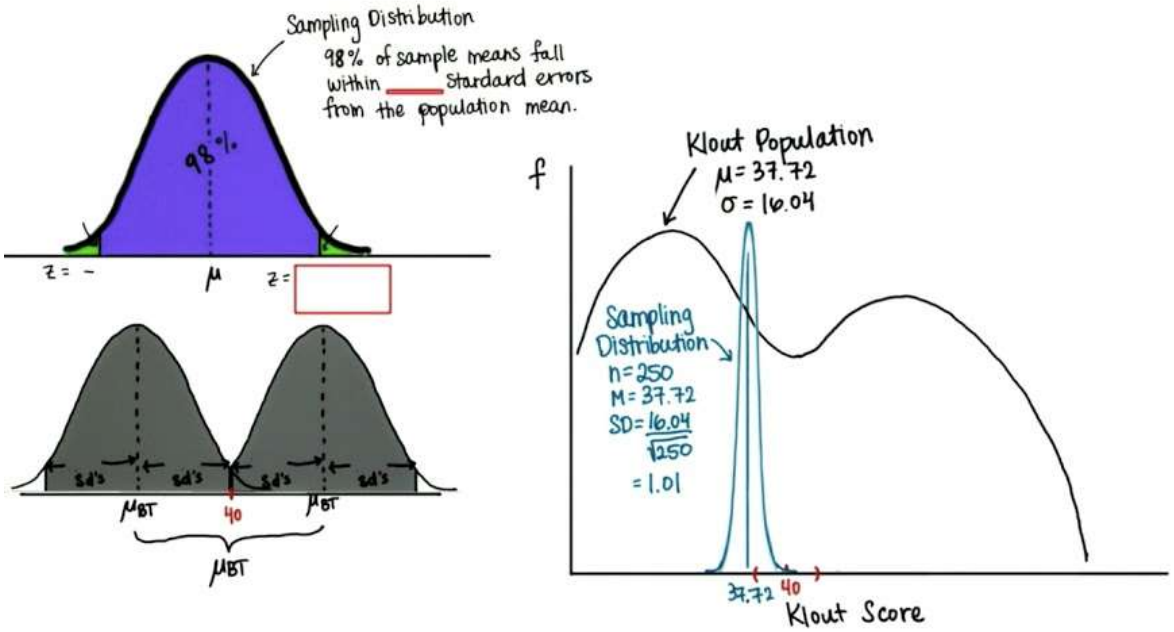
Q9:-


Sampling Distribution
95% of sample means fall within 1.96 standard errors from the population mean.
95%
2.5%
2.5%
z = -1.96
μ
z = 1.96
1.96 Sd's
μBT
40
If we construct a 95% confidence interval for what the mean Klout Score would be if everyone used the Bieber Tweeter, will the range be bigger or smaller than the one you calculated with n=35?
o bigger
o Smaller
Klout Population
μ = 37.72
σ = 16.04
f
Sampling Distribution
n = 250
M = 37.72
SD = 16.04 / √250
= 1.01
37.72
40
Klout Score

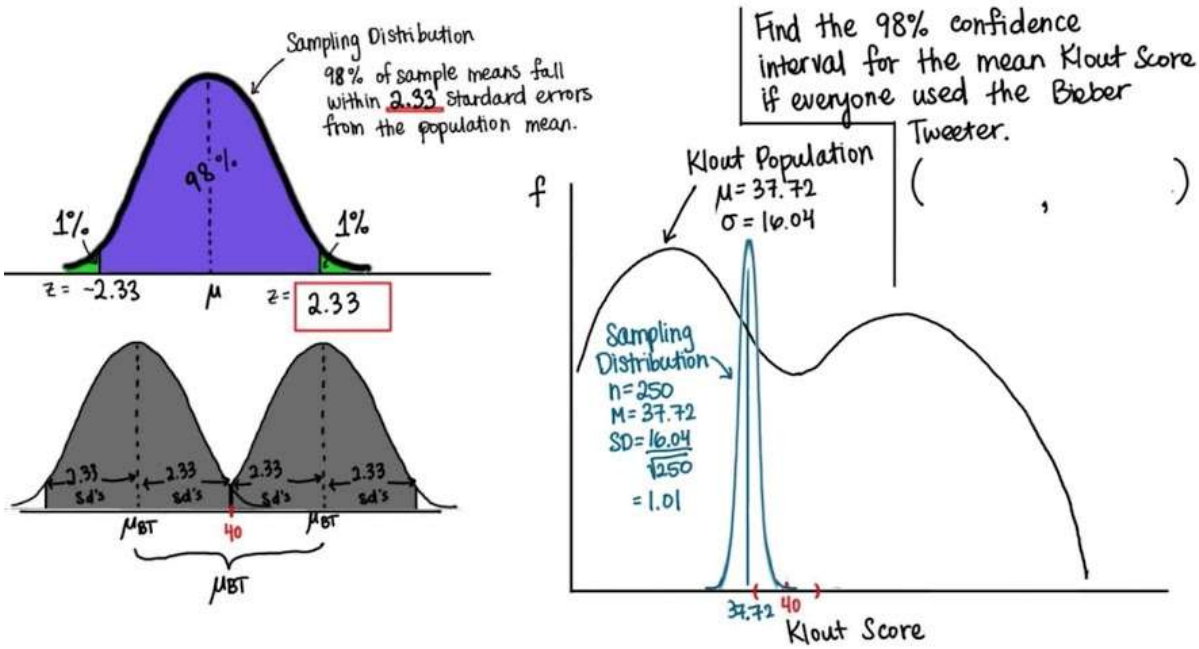
Q10:-


Sampling Distribution
95% of sample means fall within 1.96 standard errors from the population mean.
95%
2.5%
2.5%
z = -1.96
μ
z = 1.96
1.96 Sd's
μBT
40
Construct a 95% confidence interval for μBT when we get a sample of size 250 with mean 40 (x̄BT = 40).
(,)
Klout Population
μ = 37.72
σ = 16.04
f
Sampling Distribution
n = 250
M = 37.72
SD = 16.04 / √250
= 1.01
37.72
40
Klout Score

Q11:-



Q12:-



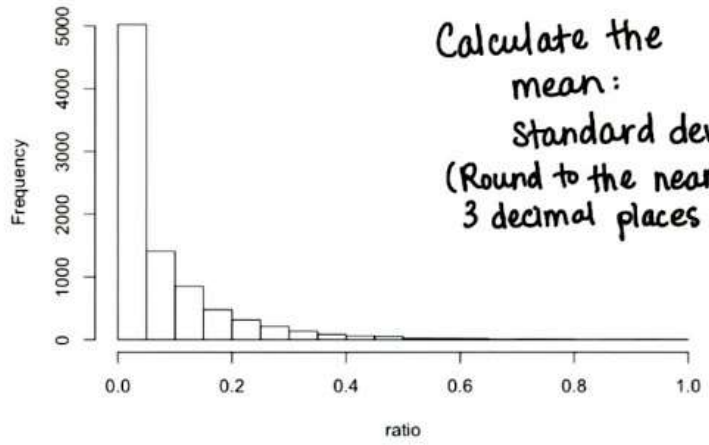
Q13:-

https://docs.google.com/spreadsheets/d/1r4nB1b_9W7-Mm_9gA9HqzBS4cDIAXcLho-ogN5ataLk/edit?usp=sharing

Confidence Intervals

Engagement ratio = $\frac{\text{Number of minutes watched}}{\text{Total Minutes Available}}$

n=8702



Calculate the
mean:
Standard deviation:
(Round to the nearest thousandths
3 decimal places X.XXX)

Q14:-

Confidence Intervals

Engagement ratio = $\frac{\text{Number of minutes watched}}{\text{Total Minutes Available}}$

n=8702
$\mu = 0.077$
$\sigma = 0.107$

If I create a lesson of songs to increase engagement ratio.

If we make this lesson available to all students, what is our point estimate for the engagement ratio based on this sample?

20 students have access to this lesson.
$\bar{x} = 0.13$
↑ Avg. engagement ratio for sample of 20 students

Q15:-

Confidence Intervals

Engagement ratio = Number of minutes watched / Total Minutes Available

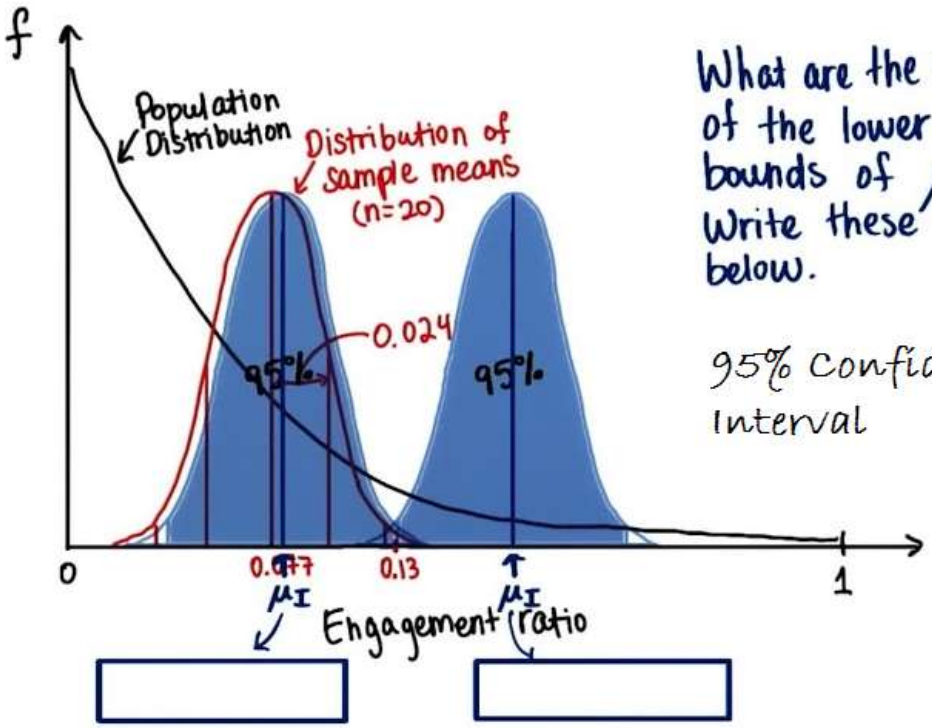
$n = 8702$
$\mu = 0.077$
$\sigma = 0.107$

20 students have access to this lesson.
$\bar{x} = 0.13$
↑ Avg. engagement ratio for sample of 20 students

Point estimate: 0.13
Interval estimate:

What's the standard error of the mean that we would use to compare this sample mean (0.13) with the means of other samples of the same size? Round to the nearest thousandths

Q16:-

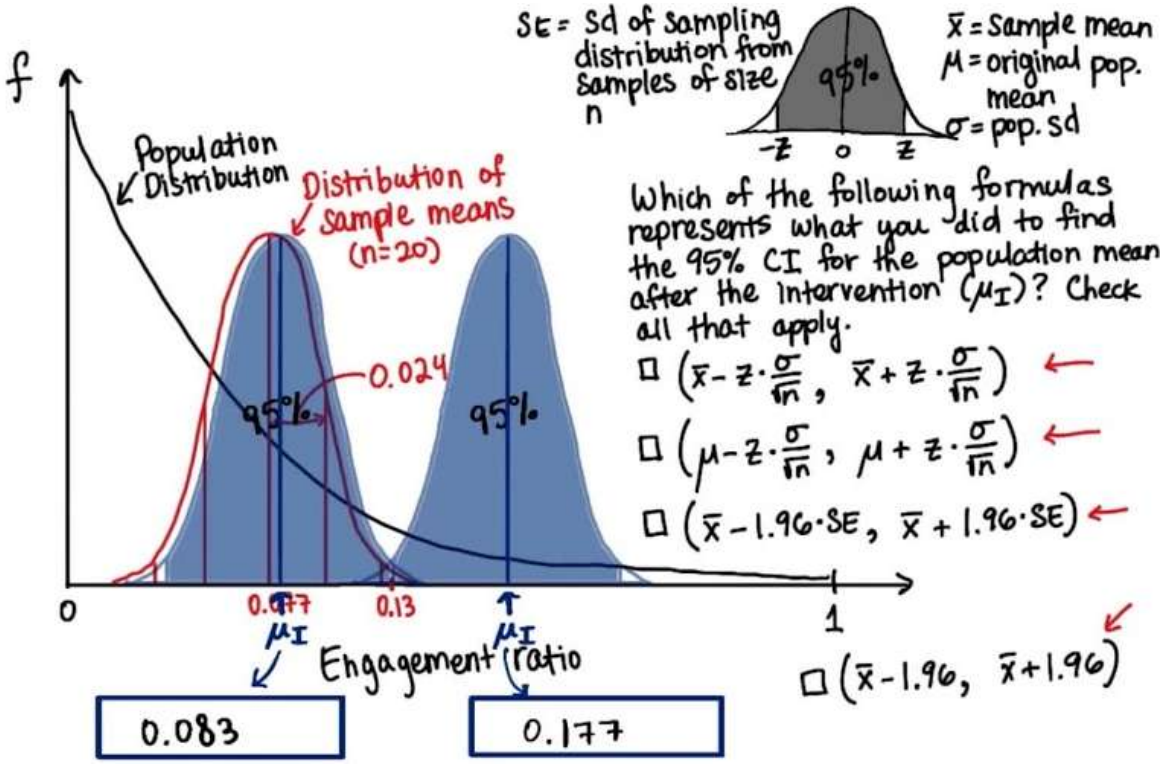


What are the values of the lower and upper bounds of μ_I? Write these values below.

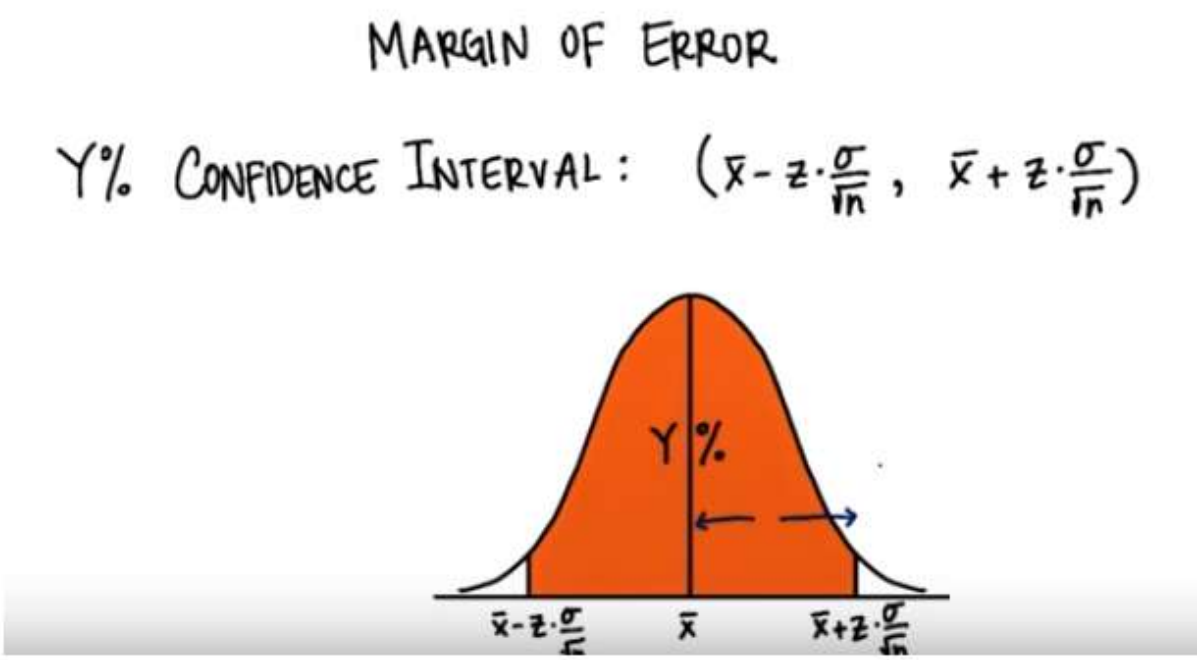
95% Confidence Interval

[ ] [ ]

Q17:-



Margin of Error



Engagement Ratio

Q18:-

Ultimately we want to know if incorporating a song about the concepts in the lesson will lead to higher engagement and learning. What statistics should we calculate to determine this?

- Note whether or not the sample means are less than or greater than the population mean
- Calculate the actual difference between each sample mean and population mean
- Find where each sample mean falls on the distribution of sample means for their respective populations
- Find how many σs each sample mean is from the population mean

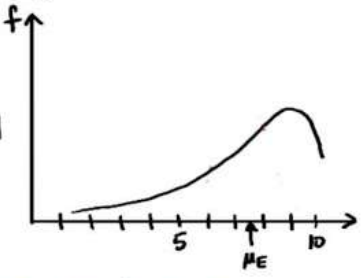
Q19:-

Measure of "Engagement"

Self-reported engagement (1 to 10)

$\mu_E = 7.5$

$\sigma_E = 0.64$



Sampling distribution (n = 20)

M_E =

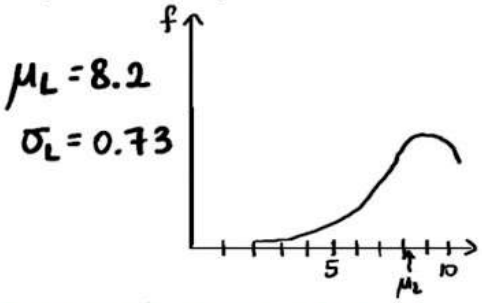
SE_E =

Measure of "Learning"

Self-reported learning (1 to 10)

$\mu_L = 8.2$

$\sigma_L = 0.73$

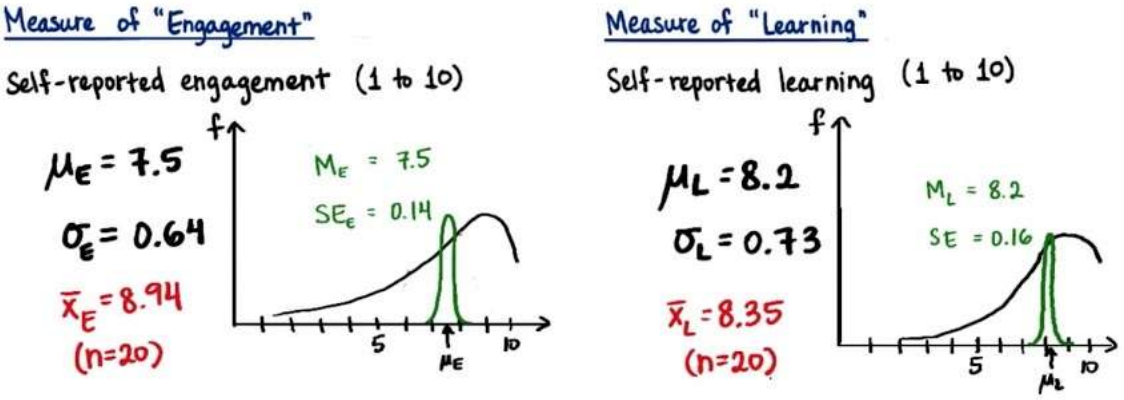


Sampling distribution (n=20)

M_L =

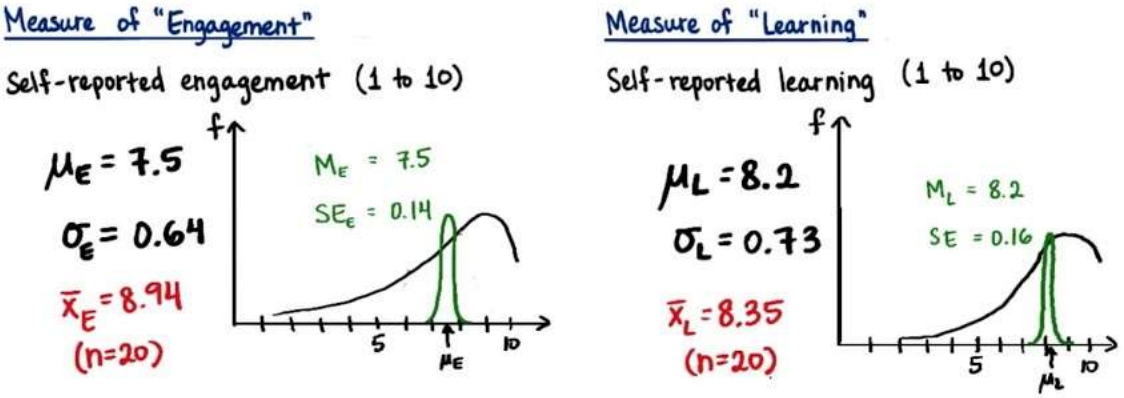
SE =

Q20:-



Find the z-scores for Engagement sample and learning sample

Q21:-



What is the probability of getting the mean greater than or equal to the sample mean ?

Q22:-

engagement

Probability of randomly selecting sample of size 20 with mean ≥8.94

Really Low!

learning

Probability of randomly selecting sample of size 20 with mean ≥8.35

.18

What can we conclude? Check all that apply.

- ☐ The song seems to have had an effect on learning, but not engagement.
- ☐ The song seems to have had an effect on engagement, but not learning.
- ☐ The song caused an increase in both learning and engagement.
- ☐ The song caused an increase in engagement, but not learning.

Summary

Treatment

- Bieber Tweeter
- Song about hypothesis testing

Dependent variables

- Klout scores
- Engagement and learning self-reported scores from 1 to 10