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# Problem Set – Lesson 7

**Q1:-**

The Central Limit Theorem tells us which of the following about the distribution of sample means?

- The predicted shape of the distribution
- The expected value of the mean of the distribution
- The standard deviation of the distribution (standard error)
- All of the above

**Q2:-**

We can best describe the location of a sample mean in a sampling distribution in terms of:

- The population standard deviation
- The absolute difference between the sample mean and the population mean
- The standard error

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**Q3:-**

A random sample of size 36 is selected from a population with parameters $\mu = 100$ and $\sigma = 18$. On average, how much difference would you expect between the mean of this sample and the population mean? (I.e. What is the standard error of a sampling distribution composed of means taken from samples of size 36?

- ○ 0
- ○ 3
- ○ 6
- ○ 18

**Q4:-**

When the sample size increases, the standard error:

- ○ increases
- ○ decreases
- ○ stays the same
- ○ is equal to sigma

**Q5:-**

For a particular population, the sampling distribution that results from samples of size 4 has a standard error of 10. For the same population, the sampling distribution that results from samples of size 16 would have a standard error of :

- 5
- 20
- 2.5
- 10

**Q6:-**

Which of the following sample sizes taken from a population with standard deviation $\sigma$ would result in a sampling distribution with a standard error of 4 units?

- $n = 5$ and $\sigma = 20$ units
- $n = 25$ and $\sigma = 20$ units
- $n = 4$ and $\sigma = 64$ units
- $n = 4$ and $\sigma = 16$ units

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**Q7:-**

A sample is obtained from a population with $\mu = 100$ and $\sigma = 20$. Which of the following samples, when plotted on the sampling distribution of other samples of the same size, has a mean whose z-score is closest to 0?

- ○ $n = 25$     $\bar{x} = 104$
- ○ $n = 100$    $\bar{x} = 104$
- ○ $n = 100$    $\bar{x} = 102$
- ○ $n = 25$     $\bar{x} = 102$

**Q8:-**

A normally distributed population has a mean of $\mu = 100$ and a standard deviation of $\sigma = 20$.

What is the mean of the distribution of sample means from samples of size $n = 4$?

**Q9:-**

A normally distributed population has a mean of $\mu = 100$ and a standard deviation of $\sigma = 20$.

What is the standard error for the sampling distribution from samples of size 4?

**Q10:-**

A normally distributed population has a mean of $\mu = 100$ and a standard deviation of $\sigma = 20$.

What is the z-score of a sample mean of 110, taken from a sample of size 4?

**Q11:-**

A normally distributed population has a mean of $\mu = 100$ and a standard deviation of $\sigma = 20$.

What is the probability of randomly selecting a sample of size 4 that has a mean greater than 110?

(You may estimate based on what you learned in Lesson 4.)

_____ (or _____%)
     ↑                    ↑
proportion          percent

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## Q12:-

A normally distributed population has a mean of $\mu=100$ and a standard deviation of $\sigma=20$.

If we increase the sample size to 25, what is the mean of the distribution of sample means?

## Q13:-

A normally distributed population has a mean of $\mu=100$ and a standard deviation of $\sigma=20$.

If we increase the sample size to 25, what is the standard error of the distribution of sample means?

## Q14:-

A normally distributed population has a mean of $\mu=100$ and a standard deviation of $\sigma=20$.

What is the probability of randomly selecting a sample of size 25 with a mean greater than 110?

_____ (or _____ %)

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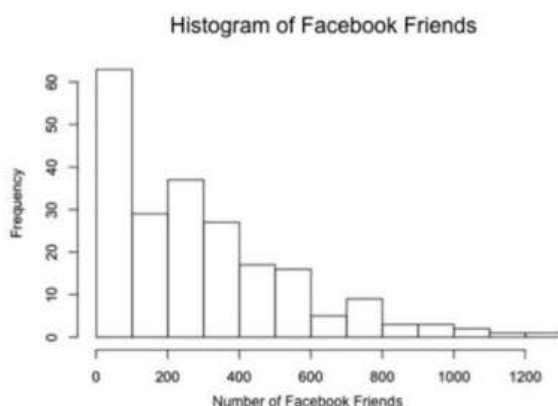☎ - 9923170071, 8108094992

## Q15:-

Why did the probability of randomly selecting a sample mean greater than 110 _decrease_ when we used a sample of size 25 rather than a sample of size 4? (Check all that apply.)

○ The bigger sample size resulted in a bigger z-score for that sample mean

○ The bigger the sample size, the larger the standard error.

○ The bigger the z-score, the less the proportion of sample means greater than that sample mean.

○ Bigger sample sizes result in skinnier sampling distributions.

## Q16:-

This question refers to the data on the number of Facebook friends Udacity students have (link below).
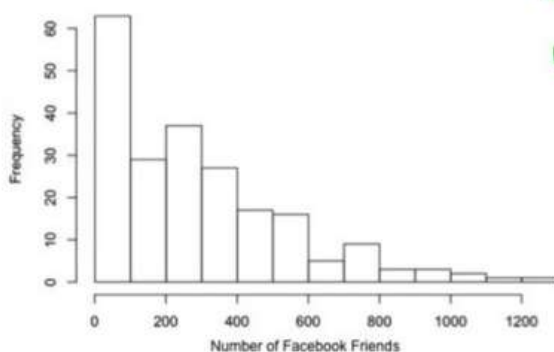Here is a histogram of the data. This distribution is:

Histogram of Facebook Friends

Positively skewed
Negatively skewed
Normal
Uniform

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### Q17:-

This question refers to the data on the number of Facebook friends students have (link below).

Here is a histogram of the data. If we take all samples of size 10, find the average of each, and create a distribution of sample means, this distribution will be:
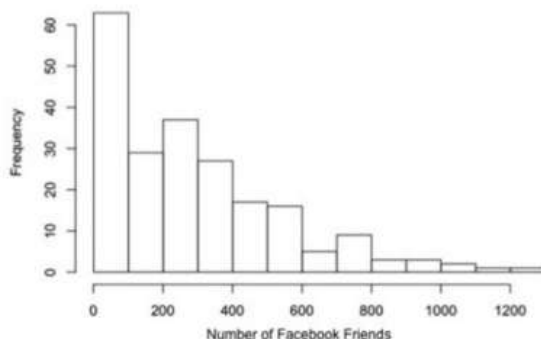
Histogram of Facebook Friends



- ○ Positively skewed
- ○ Negatively skewed
- ○ Normal
- ○ Uniform

**https://docs.google.com/spreadsheets/d/1ufyIMk4QiExkPiNlL9axmCZuPx aE7Ea5ZPigrqM0D74/edit?usp=sharing**
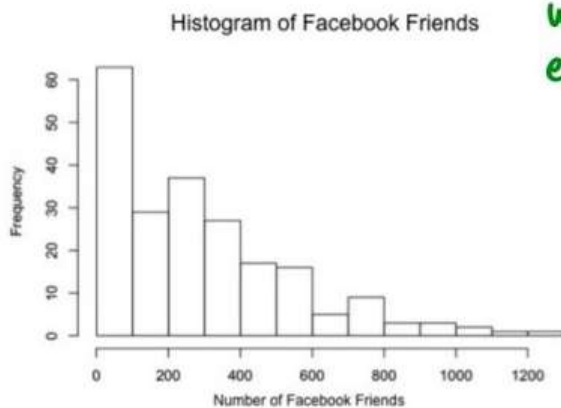
### Q18:-

If we take all samples of size 10, find the average of each, and create a distribution of sample means, this distribution will have a mean equal to:

Histogram of Facebook Friends

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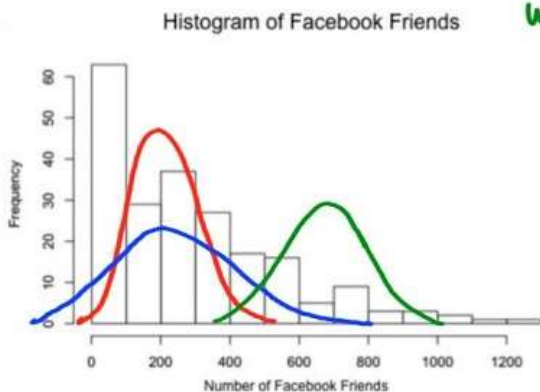DIMENSIONLESS
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**Q19:-**

If we take all samples of size 10, find the average of each, and create a distribution of sample means, this distribution will have a standard deviation equal to:



Histogram of Facebook Friends

**Q20:-**

This question refers to the data on the number of Facebook friends students have

If we take all samples of size 10, find the average of each, and create a distribution of sample means, this distribution will look like which of the following?



Histogram of Facebook Friends

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**Q21:-**

This question refers to the data on the number of Facebook friends students have

If we take all samples of size 50, find the average of each, and create a distribution of sample means, this distribution will have a standard deviation

Histogram of Facebook Friends
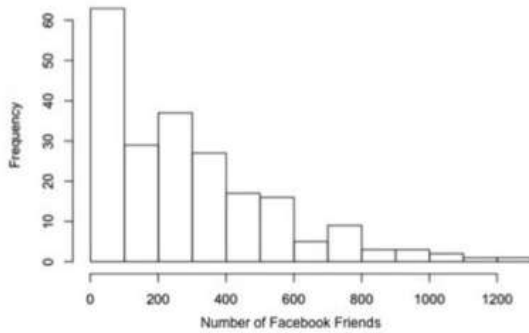
○ Greater than that of the sampling distribution from means of samples of size 10.

○ Less than that of the sampling distribution from means of samples of size 10.

**Q22:-**

The blue sampling distribution results from plotting the means of all samples of size 25. What sample size would we need to have a standard error one-third this size (red sampling distribution)?

Population

$x/3$

$x$