



**STUDYDADDY**

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Late assignments lose 5 pts per day.

Submit a .doc or .pdf file into D2L Assessment => Assignments; there is a folder called Minitab #3.

Use Minitab to illustrate the Central Limit Theorem (CLT), the CLT tells us about the sampling distribution of the sample mean. With Minitab we can easily “sample” from a population with known properties ( $\mu, \sigma$ , shape).

1. Our population consists of integer values  $X$  from 1 through 8, all equally likely

$$P(x) = 1/8; x = 1, 2, 3, 4, 5, 6, 7, 8$$

- a. Using methods from the beginning of Chapter 4 in the textbook, find  $\mu$  and  $\sigma$ .

Use your calculator not Minitab to find  $\mu$  and  $\sigma$ .

- b. Graph the population probability distribution.

Click on Graph => Probability Distribution plot => Integer

Minimum = 1 Maximum = 8

Does this graph “look” normal? Is the graph symmetric?

- c. Take a sample of size 5 from this population and compute the sample mean. Repeat this process 1000 times.

Click on Calc => Random Data => Integer

Generate 1000

Store in columns C1-C5

Minimum 1

Maximum 8

Compute the mean of each sample (row) and store the sample means in C6.

Note: C6 has 1000 sample means each a sample of size  $n=5$ .

Click on Calc => Row Statistics

Mean

Input Variables C1-C5

Store C6

- d. Compute the mean and stand. dev. of your 1000 sample means.

Click on Stat => Basic Statistics => Display Descriptive Statistics

Variable C6

What did you expect for the mean of the sample means?

What did you get?

What did you expect for the stand. dev. of the sample means?

What did you get?

Briefly explain, how this illustrates 2 parts of the CLT.

- e. Draw a histogram of your sample means.

Click on Graph => Histogram Simple

Graph Variable C6

Discuss how this graph illustrates the CLT.

2. Our population comes from a Gamma distribution which is skewed with a minimum of 0. The mean of this distribution is  $\mu = 10$  with  $\sigma = 7.07$ .

a. Graph the population probability distribution.

Click on Graph  $\Rightarrow$  Probability Distribution plot  $\Rightarrow$  Gamma shape = 2, scale = 5.

Does this graph “look” normal?

Is it skewed right or skewed left?

b. Take a sample of size 40 from this population and compute the sample mean. Repeat this process 1000 times.

Click on Calc  $\Rightarrow$  Random Data  $\Rightarrow$  Gamma

Generate 1000

Store in columns C1-C40

Shape 2

Scale 5

Compute the mean of each sample (row) and store the sample means in C41.

Note: C41 has 1000 sample means each a sample of size  $n=40$ .

Click on Calc  $\Rightarrow$  Row Statistics

Mean

Input Variables C1-C40

Store C41

c. Compute the mean and stand. dev. of your 1000 sample means.

Click on Stat  $\Rightarrow$  Basic Statistics  $\Rightarrow$  Display Descriptive Statistics

Variable C41

What did you expect for the mean of the sample means?

What did you get?

What did you expect for the stand. dev. of the sample means?

What did you get?

Briefly explain, how this illustrates 2 parts of the CLT.

d. Draw a histogram of your sample means.

Click on Graph  $\Rightarrow$  Histogram 

Simple
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Graph Variable C41

Discuss how this graph illustrates the CLT.



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