

Quiz and examples

*In a dental office 10,000 people come for an intervention. The doctors mark the situation of each intervention in the patient file. The number of extracted left upper canine was 1500. Compute the probability of a patient coming to a consultation to come for an extracted left upper canine.

- A. 85
- B. 15
- C. 0.15
- D. 8500
- E. 0.85

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B. 15

C. 0.15

D. 8500

E. 0.85

Questions at theoretical exam - Example

*In a dental office 10,000 people come for an intervention. The doctors mark the situation of each intervention in the patient file. The number of extracted left upper canine was 1500. The number of extracted right upper canine was 500. Compute the probability of a patient coming to a consultation to come for an extracted left upper canine and right upper canine if we suppose that this events are independent.

- A. 1500
- B. 0.0075
- C. 0.1500
- D. 0.75%
- E. 0.1925

Questions at theoretical exam - Example

*In a dental office 10,000 people come for an intervention. The doctors mark the situation of each intervention in the patient file. The number of extracted left upper canine was 1500. The number of extracted right upper canine was 500. Compute the probability of a patient coming to a consultation to come for an extracted left upper canine and right upper canine if we suppose that this events are independent.

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- A. 1500
- B. 0.1925
- C. 0.1500
- D. 19.25%
- E. 0.05

Questions at theoretical exam - Example

*In a dental office 10,000 people come for an intervention. The doctors mark the situation of each intervention in the patient file. The number of extracted left upper canine was 1500. The number of extracted right upper canine was 500. Compute the probability of a patient coming to a consultation to come for an extracted left upper canine or right upper canine if we suppose that this events are independent.

A. 1500

B. 0.1925

C. 0.1500

D. 19.25%

E. 0.05

Questions at theoretical exam - Example

Mirela had frequent episodes of allergy when she was a child, when she presented rhinorrhea (nasal secretions). She is now a teenager. The probability of an individual to have at least one respiratory tract episode this winter season is 0.80. Symptoms of respiratory viruses include coughing, rhinorrhea and sore throat. If Mirela has a respiratory episode this season, which of the following statements do we know are true, given her history of allergy episodes?

- A. It is more likely to have “cough” or “nasal discharge” than “cough and nasal discharge”
- B. “Cough and nasal discharge” are more likely than just “coughing”
- C. “Cough and nasal discharge” are more likely than “cough, nasal discharge and sore throat”
- D. It is more likely to present only “coughs” than “coughs and nasal secretions”
- E. “Cough and nasal discharge” are more likely than “cough or nasal discharge”

Questions at theoretical exam - Example

Mirela had frequent episodes of allergy when she was a child, when she presented rhinorrhea (nasal secretions). She is now a teenager. The probability of an individual to have at least one respiratory tract episode this winter season is 0.80. Symptoms of respiratory viruses include coughing, rhinorrhea and sore throat. If Mirela has a respiratory episode this season, which of the following statements do we know are true, given her history of allergy episodes?

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- D. It is more likely to present only “coughs” than “coughs and nasal secretions”
- E. “Cough and nasal discharge” are more likely than “cough or nasal discharge”

A subset can never be more probable than the set that contains it

Allergy in the childhood and respiratory tract episode are two independent disease (events)

*DBP is normal distributed with $\mu=80$ and $\sigma=5$ mmHg. How many subjects had DBP above or equal with 80mmHg?

A. 10

B. 50

C. 80

D. None of the above

E. 0

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B. 50

C. 80

D. None of the above

E. 0

In a standard normal distribution, how many values in percentages are between 0 and 1?

A. 50

B. 47.7

C. 34.1

D. None of the above

E. 68.2

In a standard normal distribution, how many values in percentages are between 0 and 1?

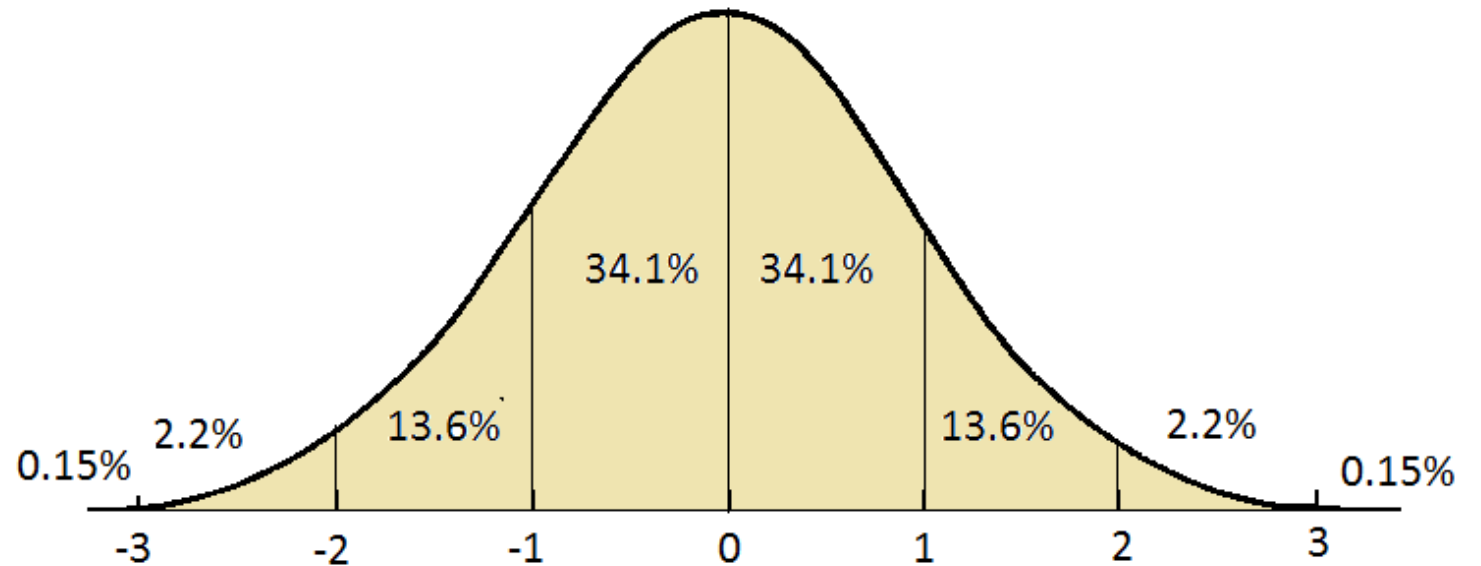
A. 50

B. 47.7

C. 34.1

D. None of the above

E. 68.2



In a standard normal distribution, how many values in percentages are above 2?

A. 5

B. 2.5

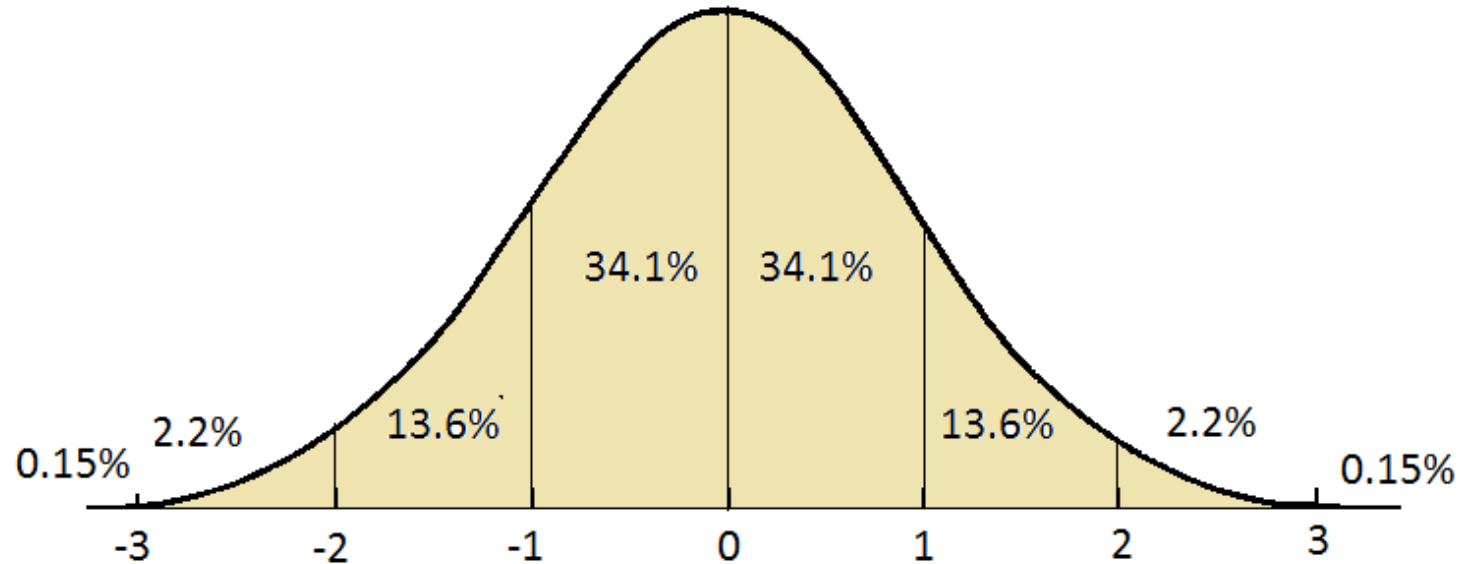
C. 2.2

D. None of the above

E. 2.35

In a standard normal distribution, how many values in percentages are above 2?

- A. 5
- B. 2.5
- C. 2.2
- D. None of the above
- E. 2.35



*In a standard normal distribution, which value from the following is the most probable to divide the area under the curve in 95% and 5%?

A. 3

B. 2

C. 1.6

D. 0.6

E. 0

*In a standard normal distribution, which value from the following is the most probable to divide the area under the curve in 95% and 5%?

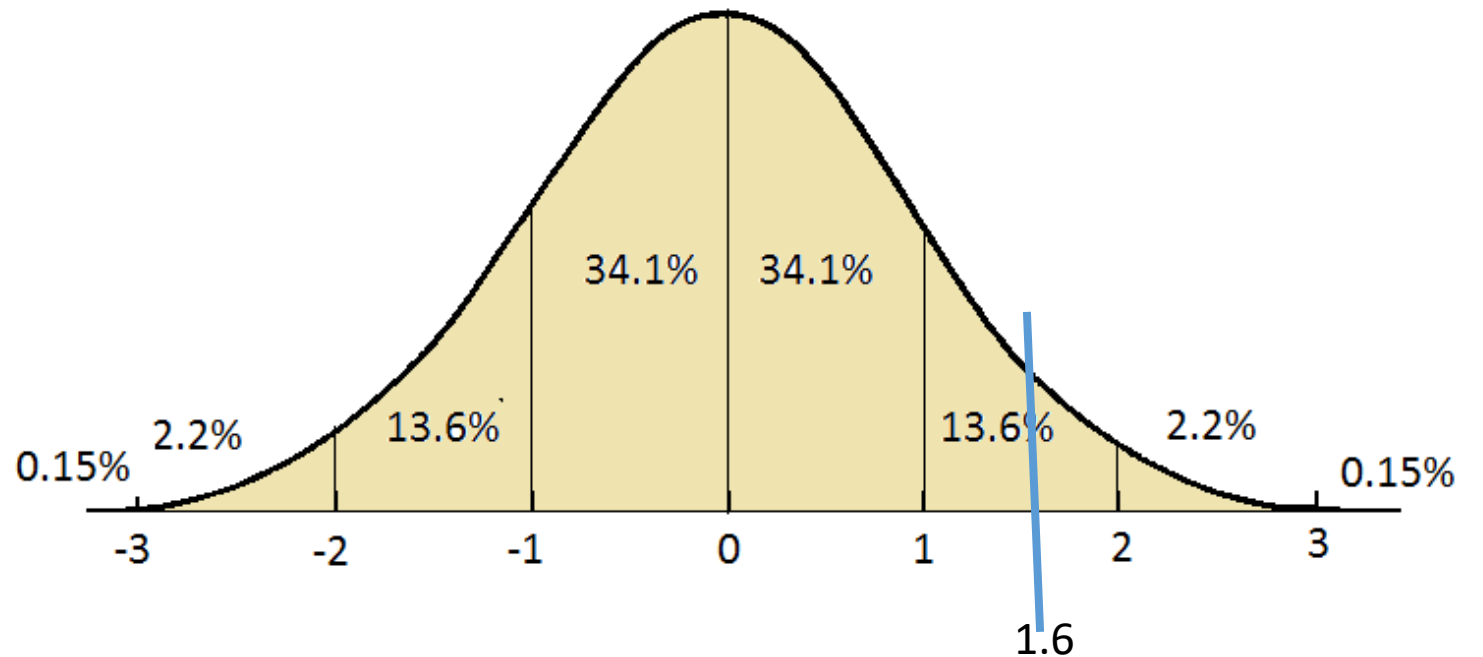
A. 3

B. 2

C. 1.6

D. 0.6

E. 0

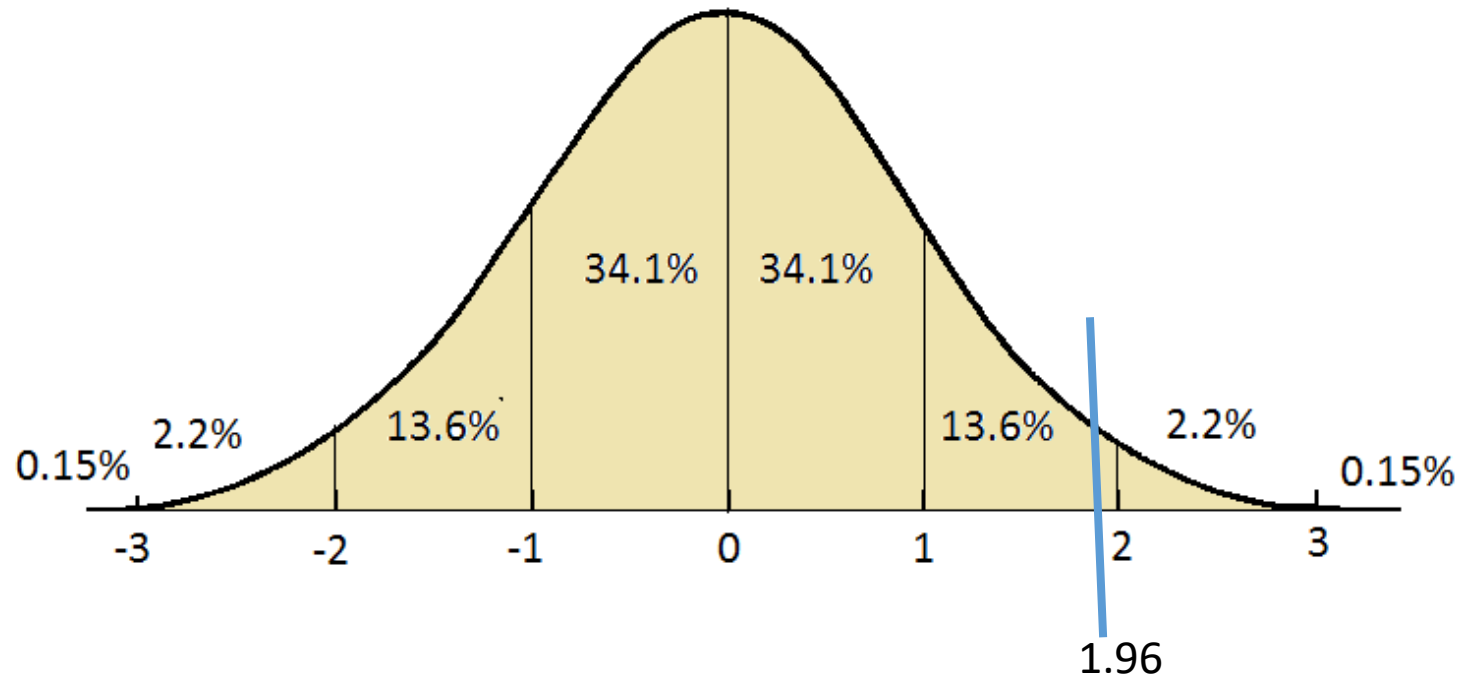


*In a standard normal distribution, which value from the following is the most probable to divide the area under the curve in 97.5% and 2.5%?

- A. 3
- B. 2
- C. 1.96
- D. 1.56
- E. 0.86

*In a standard normal distribution, which value from the following is the most probable to divide the area under the curve in 97.5% and 2.5%?

- A. 3
- B. 2
- C. 1.96
- D. 1.56
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*SBP is normal distributed with $\mu=120$ and $\sigma=10$ mmHg. Which value of DBP divide the area under the curve in 5% and 95% in the sample distribution of the mean? ($Z_{\alpha}=1.645$)

- A. 136.45
- B. 101.75
- C. 120
- D. 140
- E. 10

*SBP is normal distributed with $\mu=120$ and $\sigma=10$ mmHg. Which value of DBP divide the area under the curve in 5% and 95% in the sample distribution of the mean? ($Z_{\alpha}=1.645$)

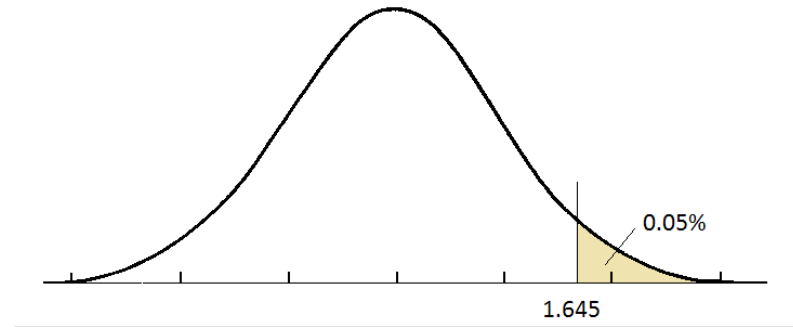
A. 136.45

B. 101.75

C. 120

D. 140

E. 10



$$z = \frac{X - \mu}{\sigma}$$

$$1.645 = \frac{X - 120}{10}$$

$$10 \times 1.645 = X - 120$$

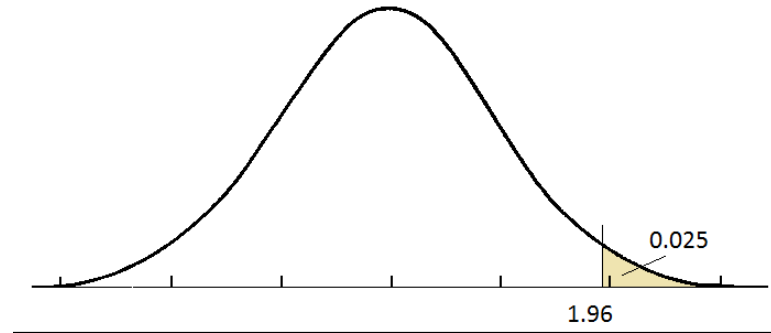
$$136.45 = X$$

*SBP is normal distributed with $\mu=120$ and $\sigma=10$ mmHg. Which value of DBP divide the area under the curve in 5% and 95% in the sample distribution of the mean? ($Z_{\alpha}=1.96$)

- A. 139.6
- B. 101.75
- C. 120
- D. 150
- E. 10

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- A. 139.6
- B. 101.75
- C. 120
- D. 150
- E. 10



$$1.96 = \frac{X - 120}{10}$$
$$19.6 = X - 120$$
$$139.6 = X$$

*DBP is normal distributed with $\mu=80$ and $\sigma=5$ mmHg. Which value of DBP divide the area under the curve in 5% and 95% in the sample distribution of the mean? ($Z_{\alpha} = -1.645$)

- A. 88.225
- B. 71.775
- C. 86.333
- D. 80
- E. 5

*DBP is normal distributed with $\mu=80$ and $\sigma=5$ mmHg. Which value of DBP divide the area under the curve in 5% and 95% in the sample distribution of the mean? ($Z_{\alpha}=-1.645$)

A. 88.225

B. 71.775

C. 86.333

D. 80

E. 5

F. -1.645

we can check if a series is normal distributed

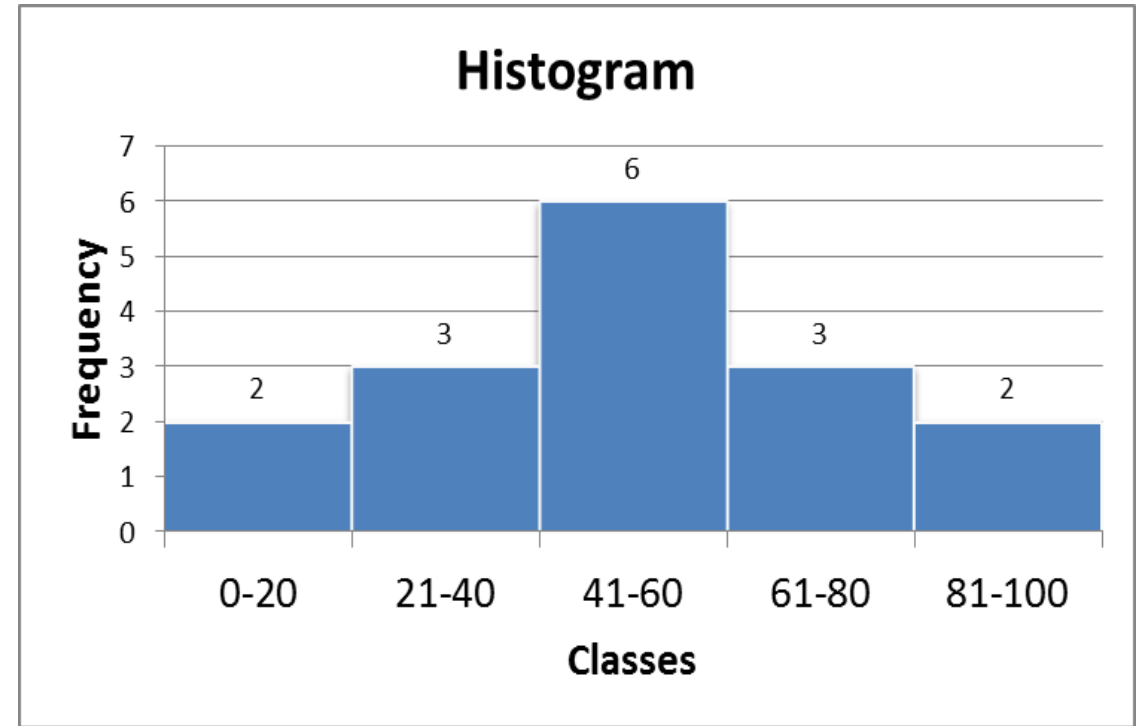
Rule: A serie of numbers is normal distributed if

- ✓ In the interval: $\text{mean} \pm \text{st.dev.}$ there are minimum 68.2% of data and
- ✓ In the interval: $\text{mean} \pm 2 * \text{st.dev.}$ there are minimum 95.4% of data and
- ✓ In the interval: $\text{mean} \pm 3 * \text{st.dev.}$ there are minimum 99.7% of data

Example 1

Series 3

- Arithmetic mean = 50
- Median = 50
- Mode = there is no
- Standard deviation = 26,71
- Quartile 1 = 34,25
- Quartile 3 = 67,75
- Skewness = 0,01
- Kurtosis = -0,23
- arithmetic mean = median ✓
- skewness between -1 to 1 ✓
- kurtosis between -1 to 1 ✓
- quartiles are symmetrical to the median ✓



From the histogram:

- symmetrical, ✓
- arithmetic mean = median ✓
- quartiles are symmetrical to the median ✓

Conclusion: The Series 3 is normal distributed from this points of view

Series 3

For normal distribution in the interval

Mean $\pm$ st.dev should be minimum 68.2% of data

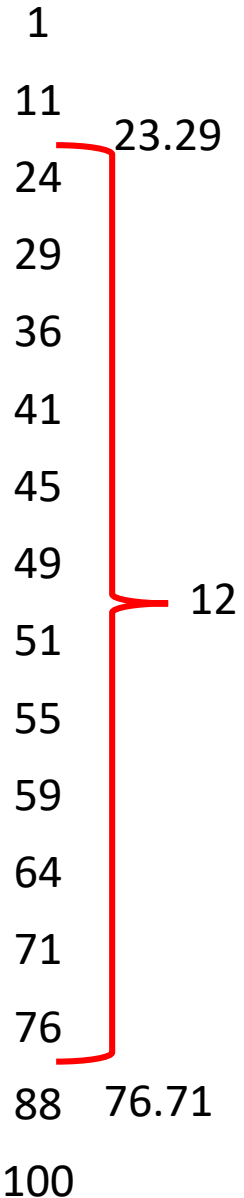


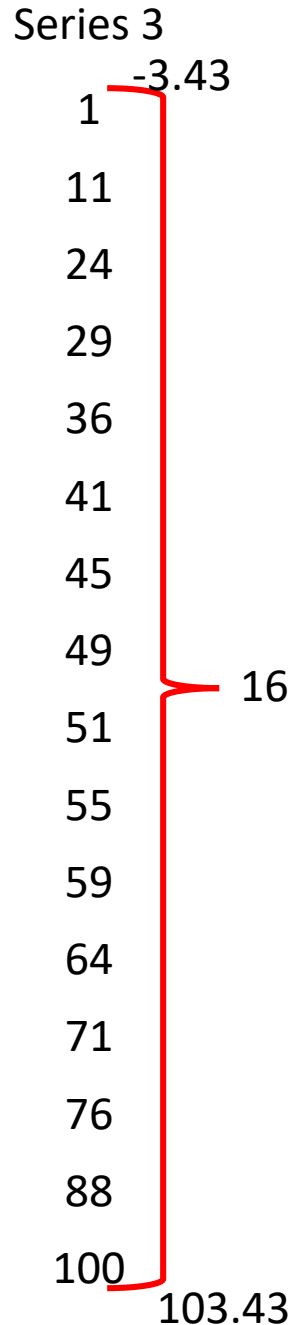
mean = arithmetic mean

st.dev. = standard deviation

- Arithmetic mean = 50 Standard deviation = 26.71
- mean $\pm$ st.dev = [50 - 26.71; 50 + 26.71] = [23.29; 76.71]
- in the interval [23.29; 76.71] are 12 values
- 12 values from 16 = $12/16 * 100 = 75\%$ of data
- in the interval [23.29; 76.71] are 75% of data

Conclusion: The Series 3 is normal distributed from this point of view





For normal distribution in the interval

Mean $\pm$ 2*st.dev should be minimum 95.4% of data ✓

Mean $\pm$ 3*st.dev should be minimum 99.7% of data ✓

- Arithmetic mean = 50 Standard deviation = 26.71

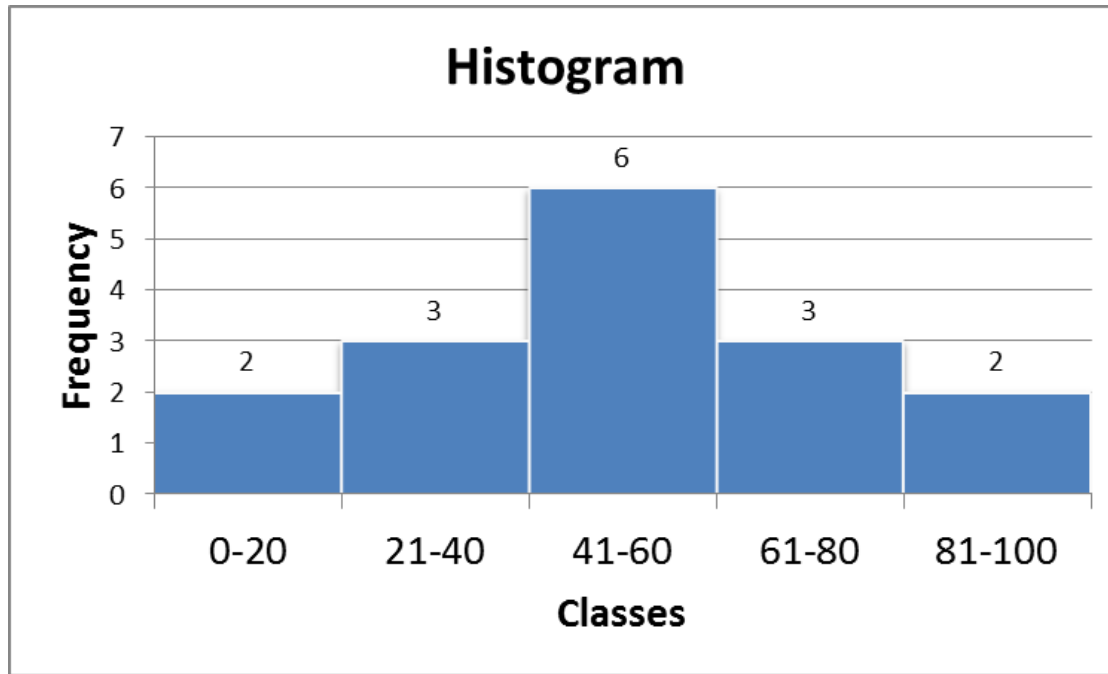
- In the interval mean $\pm$ 2*st.dev = $[50 - 2 * 26.71; 50 + 2 * 26.71] = [-3.43; 103.43]$ are 16 values (16 from 16) i.e. **100%** of data

- In the interval mean $\pm$ 3*st.dev = $[50 - 3 * 26.71; 50 + 3 * 26.71] = [-30.15; 130.15]$ are 16 values, i.e. **100%** of data

Conclusion: The Series 3 is normal distributed from this points of view

Series 3

1
11
24 23.29
29
36
41
45
49
51 12
55
59
64
71
76
88 76.71
100



For normal distribution:

Minimum 68.3% of data
Minimum 95.4% of data
Minimum 99.7% of data

This serie is normal distributed

- Arithmetic mean = 50
- Standard deviation = 26.71
- $\text{Mean} \pm \text{st.dev} = [50 - 26.71; 50 + 26.71] = [23.29; 76.71]$ are 12 values **75%** of data
- $\text{Mean} \pm 2 * \text{st.dev} = [-3.43; 103.43]$ are **100%** of data
- $\text{Mean} \pm 3 * \text{st.dev} = [-30.15; 130.15]$ are **100%** of data

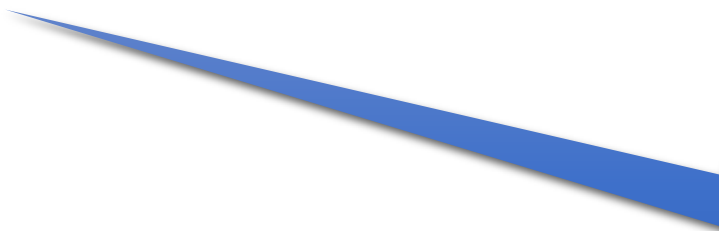
The Series 3 is normal distributed

Example 2

Series 1

1
1
2
3
5
6
6
7
93
94
94
95
97
98
98
100

- Arithmetic mean = 50
- Median=50
- Mode – there is no
- Standard deviation = 47.70
- Quartile 1 = 4.5
- Cuartile 3 = 95.5
- Skewness =0,0002
- Kurtosis = -2,29



This series is not normal distributed

Series 1

1

1

2

3

5

6

6

7

93

94

94

95

97

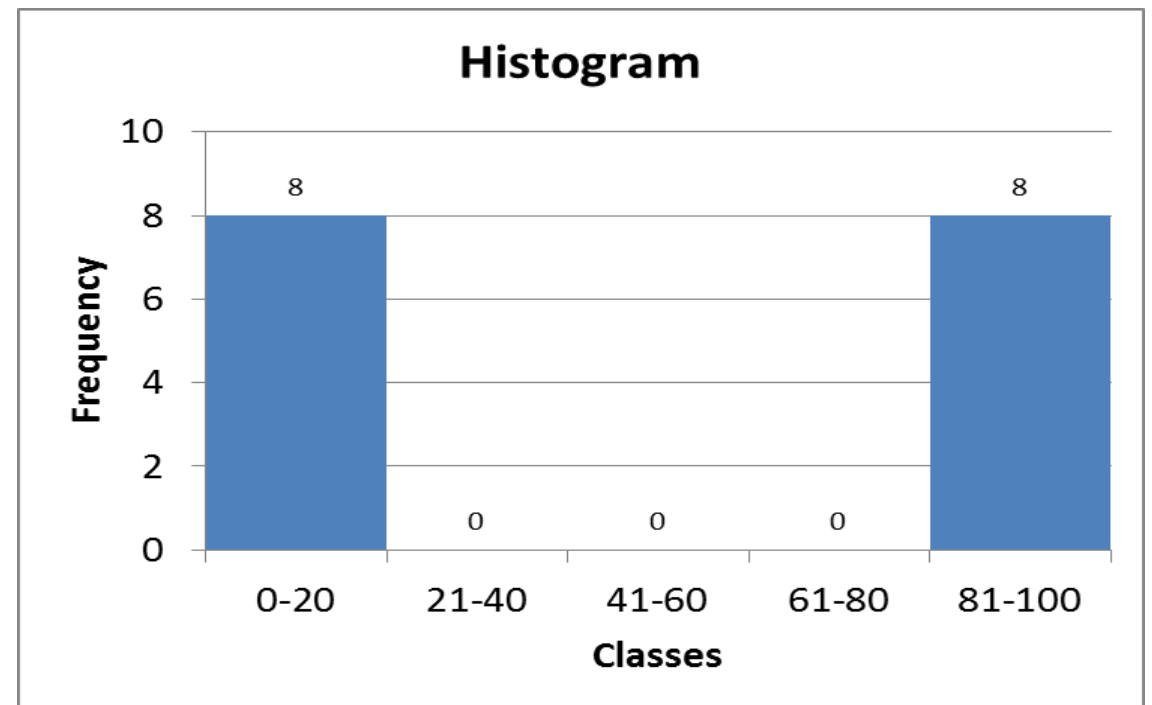
98

98

100

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- Skewness =0,0002
- Kurtosis = -2,29

- arithmetic mean = median ✓
- skewness between -1 to 1 ✓
- kurtosis between -1 to 1 X
- quartiles are symmetrical to the median ✓

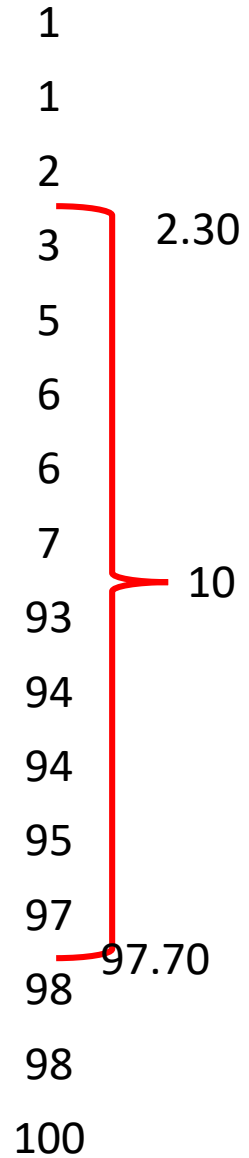


From the histogram:

- symmetrical ✓
- arithmetic mean = median ✓
- quartiles are symmetrical to the median ✓

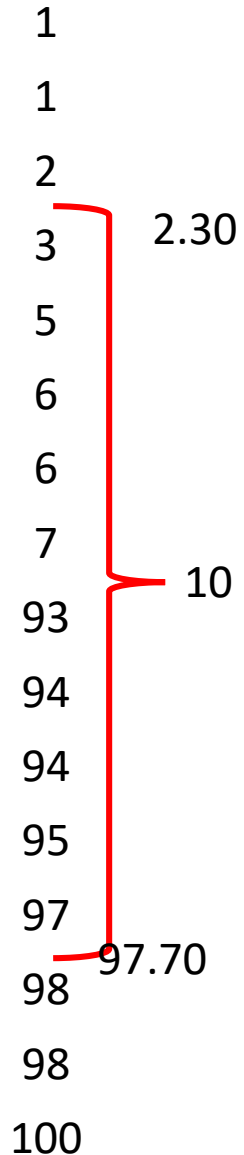
Conclusion: The Series 1 is not normal distributed

Series 1



- Arithmetic mean = 50
- Standard deviation = 47.70
- $\text{Mean} \pm \text{st.dev} = [50 - 47.7; 50 + 47.7] = [2.30; 97.70]$

Series 1



For normal distribution:

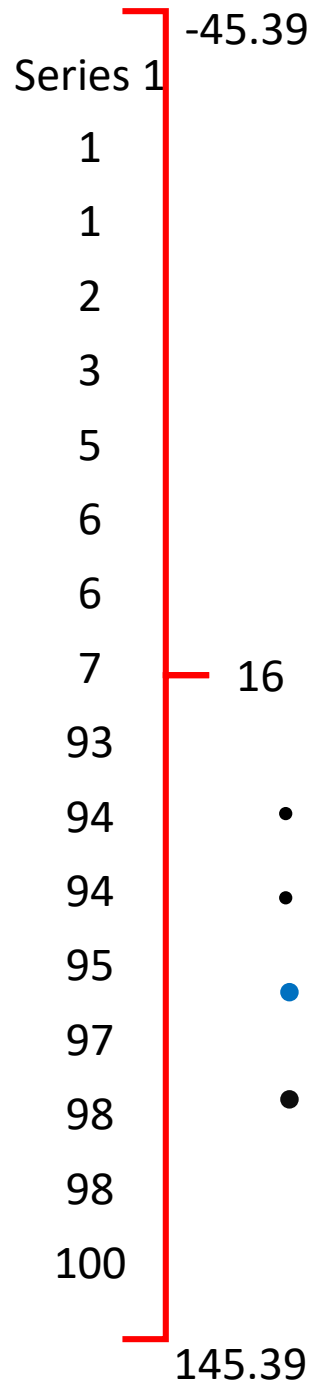
First vicinity of the mean - Minimum 68.2% of data

Should be 68.3 or higher to be normal distribution

- Arithmetic mean = 50 Standard deviation = 47.70
- Mean $\pm$ st.dev = [50-47.7; 50+47.7] = [2.30; 97.70] are 10 values, e.g. 10/16=62.5% of data

X

Conclusion: The Series 1 is not normal distributed



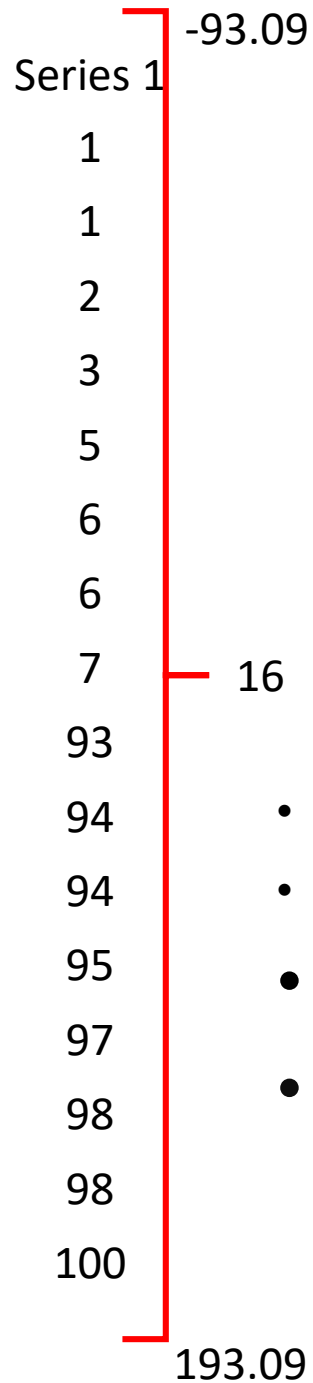
For normal distribution:

Second vicinity of the mean - Minimum 95.4% of data

Minimum 68.2% of data

Minimum 99.7% of data

- Arithmetic mean = 50
- Standard deviation = 47.70
- Second vicinity of the mean
- $\text{Mean} \pm 2 * \text{st.dev} = [50 - 2 * 47.7; 50 + 2 * 47.7] = [-45.39; 145.39]$
 - are 16 values, e.g. $16/16 = 100\%$ of data ✓



For normal distribution:

Minimum 68.2% of data

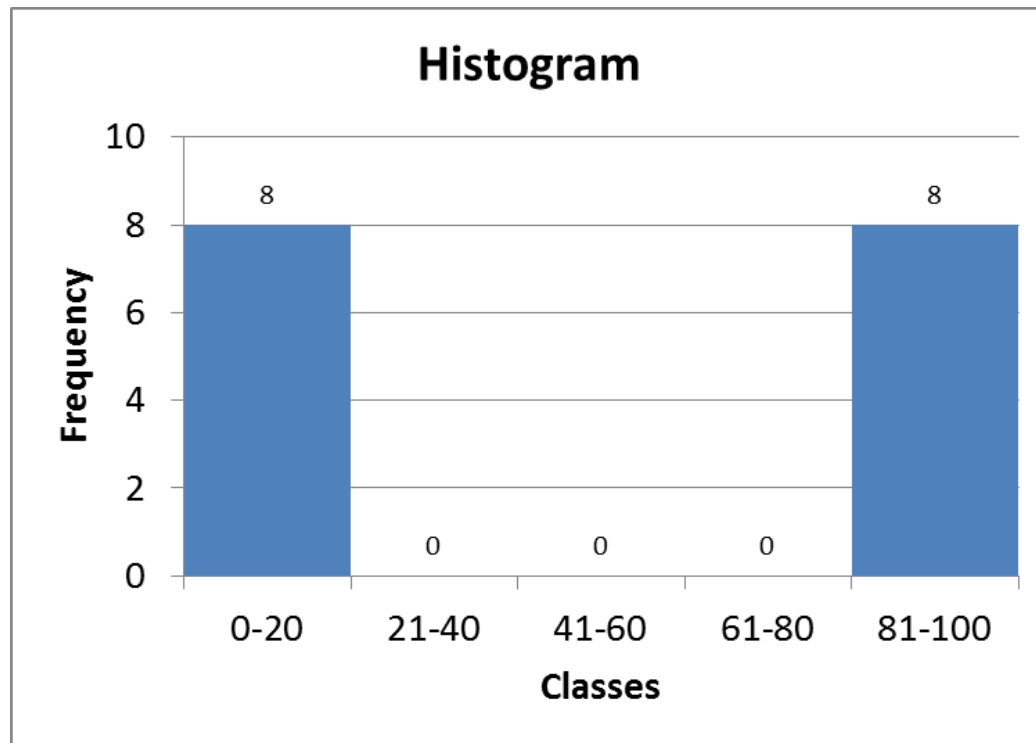
Minimum 95.4% of data

Third vicinity of the mean - Minimum 99.7% of data

- Arithmetic mean = 50
- Standard deviation = 47.70
- Third vicinity of the mean
- $\text{Mean} \pm 3 * \text{st.dev} = [50 - 3 * 47.7; 50 + 3 * 47.7] = [-93.09; 193.09]$
 - 16 values, e.g. $16/16 = 100\%$ of data



Series 1



For normal distribution:

Minimum 68.2% of data

Minimum 95.4% of data

Minimum 99.7% of data

- Arithmetic mean = 50
- Standard deviation = 47.70
- $\text{Mean} \pm \text{st.dev} = [50 - 47.7; 50 + 47.7] = [2.30; 97.70]$ are 10 values, e.g. $10/16 = 62.5\%$ of data
- $\text{Mean} \pm 2 * \text{st.dev} = [50 - 2 * 47.7; 50 + 2 * 47.7] = [-45.39; 145.39]$ are 16 values, e.g. $16/16 = 100\%$ of data
- $\text{Mean} \pm 3 * \text{st.dev} = [50 - 3 * 47.7; 50 + 3 * 47.7] = [-93.09; 193.09]$ are 16 values, e.g. $16/16 = 100\%$ of data

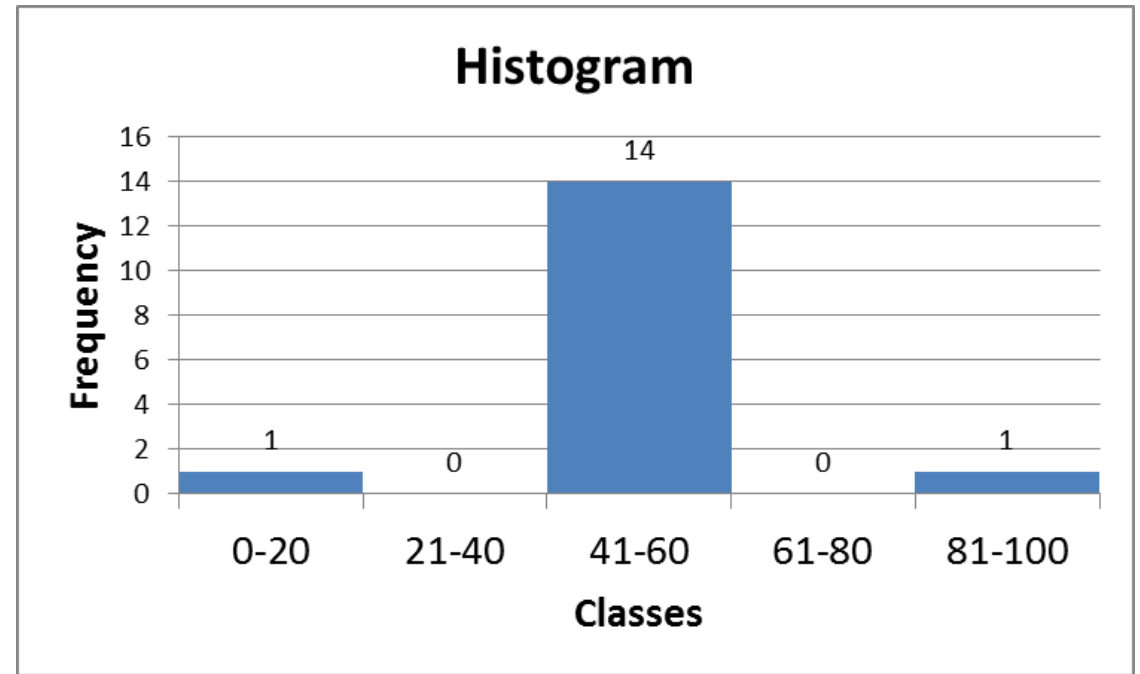
Conclusion: The Series 1 is not normal distributed

Example 3

Series 2

- Arithmetic mean = 50
- Median=50
- Mode = 50
- Standard deviation = 18,37
- Quartile 1 = 47.5
- Cuartile 3 = 52.5
- Skewness =0,09
- Kurtosis = 6,81

- arithmetic mean = median ✓
- skewness between -1 to 1 ✓
- kurtosis between -1 to 1 ✗
- quartiles are symmetrical to the median ✓



From the histogram:

- symmetrical ✓
- arithmetic mean = median ✓
- quartiles are symmetrical to the median ✓

Conclusion: The Series 2 is not normal distributed

Series 2

1 31.63

44

45

46

48

48

49

50

50

51

52

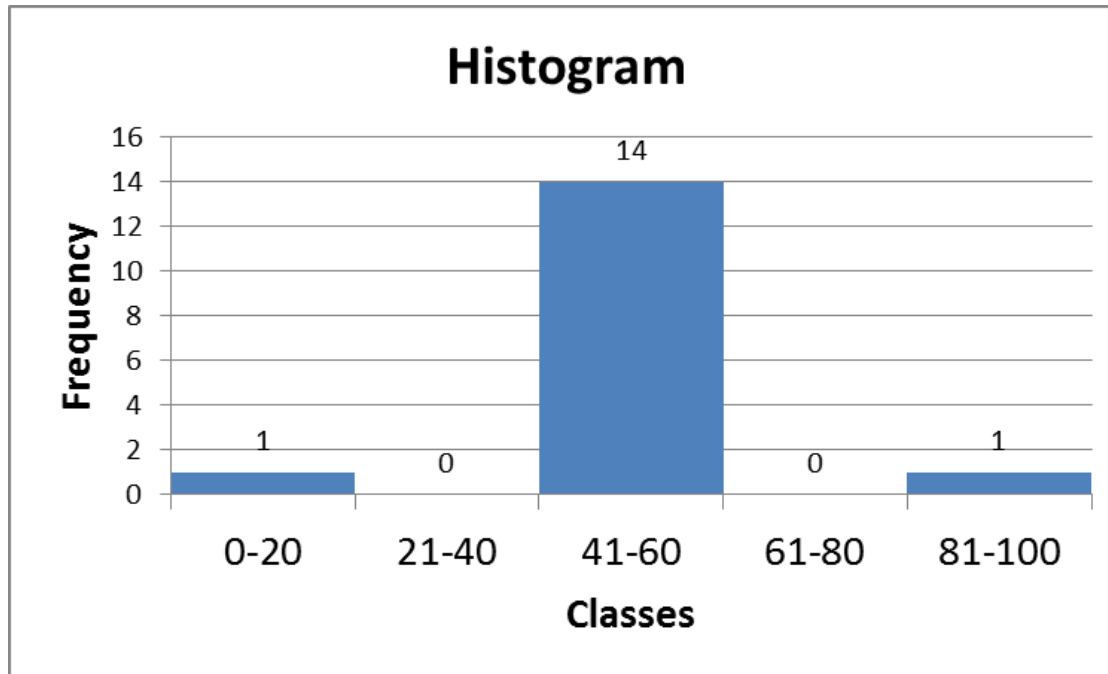
52

54

55

55

100



For normal distribution:

Minimum 68.2% of data

Minimum 95.4% of data

Minimum 99.7% of data

- Arithmetic mean = 50
- Standard deviation = 18.37
- $\text{Mean} \pm \text{st.dev} = [50 - 18.37; 50 + 18.37] = [31.63; 68.37]$
14 values, e.g. $14/16 = 87.5\%$ of data
- $\text{Mean} \pm 2 * \text{st.dev} = [50 - 2 * 18.37; 50 + 2 * 18.37] = [13.26; 86.74]$
14 values, **87.5%** of data
- $\text{Mean} \pm 3 * \text{st.dev} = [-5.11; 105.11]$
 - 16 values, **100%** of data

Conclusion: The Series 2 is not normal distributed