Student: Ha Thanh Nga
Date: 7/9/2023

Instructor: Lewis Njualem
Course: ADMN 2100 (60) - APP BUS STATISTICS

Assignment: Homework Assignment # 2 - NEUV

1. The following is a set of data from a sample of n = 5.

4 7 5 8 10

a. Compute the mean, median, and mode.
b. Compute the range, variance, standard deviation, and coefficient of variation.
c. Compute the Z scores. Are there any outliers?
d. Describe the shape of the data set.

---

a. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- (●) **A.** The mean is 6.8.
  (Type an integer or a decimal. Do not round. Use a comma to separate answers as needed)
- ( ) **B.** There is no solution.

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- (●) **A.** The median is 7.
  (Type an integer or a decimal. Do not round. Use a comma to separate answers as needed)
- ( ) **B.** There is no solution.

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ( ) **A.** The mode is .
  (Type an integer or a decimal. Do not round. Use a comma to separate answers as needed)
- (●) **B.** There is no solution.

b. The range is 6. (Type an integer or a decimal. Do not round.)

The variance is 5.7.
(Type an integer or decimal rounded to two decimal places as needed.)

The standard deviation is 2.39.
(Type an integer or decimal rounded to two decimal places as needed.)

The coefficient of variation is 35.11%.
(Type an integer or decimal rounded to two decimal places as needed.)

c. Compute the Z scores.

Data (X)	Z Score	
4	−1.17	(Round to two decimal places as needed.)
7	0.08	(Round to two decimal places as needed.)
5	−0.75	(Round to two decimal places as needed.)
8	0.5	(Round to two decimal places as needed.)
10	1.34	(Round to two decimal places as needed.)

Are there any outliers?

- (●) No
- ( ) Yes

d. What is the shape of the data set?

- (●) Positive (right-skewed)
- ( ) Symmetrical
- ( ) Negative (left-skewed)

---

2. The data set below contains the number of partners in a cohort of rising accounting firms that have been tagged as "firms to watch." Complete parts (a) through (d) below.

24	25	33	17	14	13	23	19	12	27	17	34	32
21	32	34	12	28	15	30	15	24	27	25	18	15
15	32	11	21	20	13	20	30	15				

a. Compute the mean, median, and the mode.

The mean is 21.8.
(Round to two decimal places as needed.)

The median is 21. (Round to two decimal places as needed.)

What is the mode? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** The mode(s) is/are 15.
  (Round to two decimal places as needed. Use a comma to separate answers as needed.)
- **B.** There is no mode for this data set.

b. Calculate the variance, standard deviation, range, coefficient of variation, and Z scores. Are there any outliers? Explain.

The variance is 53.69. (Round to two decimal places as needed.)

The standard deviation is 7.33. (Round to two decimal places as needed.)

The range is 23. (Round to two decimal places as needed.)

The coefficient of variation is 33.61%. (Round to two decimal places as needed.)

Compute the Z scores for the first seven values.

Data (X)	Z Score
24	0.3
25	0.44
33	1.53
17	−0.66
14	−1.06
13	−1.2
23	0.16

(Round to two decimal places as needed.)

Compute the Z scores for the next seven values.

Data (X)	Z Score
19	−0.38
12	−1.39
27	0.71
17	−0.66
34	1.66
32	1.39
21	−0.11

(Round to two decimal places as needed.)

Compute the Z scores for the next seven values.

Data (X)	Z Score
32	1.39
34	1.66
12	-1.39
28	0.85
15	-0.93
30	1.12
15	-0.93

(Round to two decimal places as needed.)

Compute the Z scores for the next seven values.

Data (X)	Z Score
24	0.3
27	0.71
25	0.44
18	-0.52
15	-0.93
15	-0.93
32	1.39

(Round to two decimal places as needed.)

Compute the Z scores for the last seven values.

Data (X)	Z Score
11	-1.47
21	-0.11
20	-0.25
13	-1.2
20	-0.25
30	1.12
15	-0.93

(Round to two decimal places as needed.)

Are there any outliers?

- **A.** Yes, since there are no Z scores that are less than −3.0 or greater than +3.0.
- **B.** No, since there are no Z scores that are less than −3.0 or greater than +3.0.
- **C.** Yes, since there is at least one Z score that is less than −3.0 or greater than +3.0.
- **D.** No, since there is at least one Z score that is less than −3.0 or greater than +3.0.

c. Are the data skewed? If so, how?

- **A.** Yes, the data are right-skewed because the mean is greater than the median.
- **B.** No, the data are not skewed because the mean and median are equal.
- **C.** Yes, the data are left-skewed because the mean is less than the median.
- **D.** There is not enough information to determine the skewness of the distribution.

d. Based on the results of (a) through (c), what conclusions can be reached concerning the number of partners in rising accounting firms?

- **A.** The mean would be a better indicator than the median for the number of partners in rising accounting firms.

- **B.** The median would be a better indicator than the mean for the number of partners in rising accounting firms.
- **C.** Both the mean and the median are accurate indicators for the number of partners in rising accounting firms.
- **D.** Neither the mean nor the median are accurate indicators for the number of partners in rising accounting firms.

---

3. The following is a set of data from a sample of n = 11 items. Complete parts (a) through (c).

X	20	11	16	19	15	14	10	9	7	17	1
Y	40	22	32	38	30	28	20	18	14	34	2

a. Compute the sample covariance.

64.509 (Round to three decimal places as needed.)

b. Compute the coefficient of correlation.

r = 1

(Round to three decimal places as needed.)

c. How strong is the relationship between X and Y? Explain.

- **A.** The variables X and Y have no correlation.
- **B.** The variables X and Y have a perfect positive correlation because all points fall on a straight line with a positive slope
- **C.** The variables X and Y have a strong positive correlation because as X increases, Y tends to increase also.
- **D.** The variables X and Y have a perfect negative correlation because all points fall on a straight line with a negative slo

---

4. The accompanying data table shows the level of social media networking (measured as the percent of individuals polled who use social networking sites) and the GDP at purchasing power parity (PPP) per capita for each of 24 selected countries.
   a. Compute the covariance.
   b. Compute the coefficient of correlation.
   c. Based on parts (a) and (b), what conclusions can be reached about the relationship between the GDP and social media use?

[1] Click the icon to view the table of the countries' GDP and social media usage.

a. The covariance is -6851.
(Round to the nearest integer as needed.)

b. r = -0.149
(Round to three decimal places as needed.)

c. Choose the correct answer below.

- (●) **A.** There is no clear relationship between a country's GDP and its social media usage.
- ( ) **B.** There is a strong negative relationship between a country's GDP and its social media usage.
- ( ) **C.** There is a weak positive relationship between a country's GDP and its social media usage.
- ( ) **D.** There is a strong positive relationship between a country's GDP and its social media usage.

1: Table of GDP and social media usage

GDP (PPP)	Social Media Usage (%)
6,887	87
18,105	86
5,070	87
10,076	84
6,035	83
6,513	84
14,126	81
3,938	80
15,883	75
4,598	76
16,374	77
19,956	73
18,184	76
3,555	76
19,398	71
8,159	74
4,051	71
13,641	73
16,927	68
6,441	70
6,475	68
6,418	71
13,010	61
10,933	48

5. How does the empirical rule help explain the ways in which the values in a set of numerical data cluster and distribute?

The empirical rule states that for population data from a symmetric mound-shaped distribution, approximately

(1) _____ of the values are within ± 1 standard deviation from the mean, approximately (2) _____ of the values are within ± 2 standard deviation from the mean, and approximately (3) _____ of the values are within ± 3 standard deviation from the mean.

(1)
- ○ 25%
- ○ 95%
- ○ 99.7%
- ○ 75%
- ○ 50%
- ● 68%

(2)
- ○ 25%
- ○ 99.7%
- ○ 75%
- ○ 50%
- ● 95%
- ○ 68%

(3)
- ○ 25%
- ○ 68%
- ○ 95%
- ○ 75%
- ○ 50%
- ● 99.7%

6. The download and upload speeds of a mobile data carrier is of great interest to both individuals and business users. The accompanying data set contains the average download speeds in Mbps for 97 cities in the United States. Complete parts (a) through (d).

[2] Click the icon to view the download speeds.

---

a. For the average download speed, calculate the mean, median, first quartile, and third quartile.

The mean of the average download speed is 437.79 Mbps.
(Type an integer or decimal rounded to two decimal places as needed.)

The median of the average download speed is 401.38 Mbps.
(Type an integer or a decimal. Do not round.)

The first quartile of the average download speed is 350.34 Mbps.
(Type an integer or a decimal. Do not round.)

The third quartile of the average download speed is 484.385 Mbps.
(Type an integer or a decimal. Do not round.)

b. For the average download speed, calculate the range, interquartile range, variance, standard deviation, and coefficient of variation.

The range of the average download speed is 597.05 Mbps.
(Type an integer or a decimal. Do not round.)

The interquartile range of the average download speed is 134.045 Mbps.
(Type an integer or a decimal. Do not round.)

The variance of the average download speed is 14008.68.
(Type an integer or decimal rounded to two decimal places as needed.)

The standard deviation of the average download speed is 118.36 Mbps.
(Type an integer or decimal rounded to two decimal places as needed.)

The coefficient of variation for the average download speed is 27.09%.
(Type an integer or decimal rounded to two decimal places as needed.)

c. Construct a boxplot for the average download speed data. Are the data skewed? If so, how?

Construct the boxplot. Choose the correct answer below.

- Click here to view boxplot d.[3]
- Click here to view boxplot c.[4]
- Click here to view boxplot b.[5]
- Click here to view boxplot a.[6]

Are the data skewed? If so, how?

- **A.** Yes, the distribution is right-skewed since the left tail is slightly longer than the right tail.
- **B.** Yes, the distribution is right-skewed since the right tail is significantly longer than the left tail.
- **C.** No, the distribution is roughly symmetric because the left tail is about the same length as the right tail.
- **D.** Yes, the distribution is left-skewed since the left tail is significantly longer than the right tail.
- **E.** Yes, the distribution is left-skewed since the right tail is slightly longer than the left tail.

d. What can be concluded about the download speeds for the various U.S. cities?

The average of the download speeds is 437.79 Mbps, where 50% of the cities have an average download speed less than 437.79 Mbps. The middle 50% of cities have an average download speed between 350.3 Mbps and 484.39 Mbps.
(Type integers or decimals rounded to two decimal places as needed.)

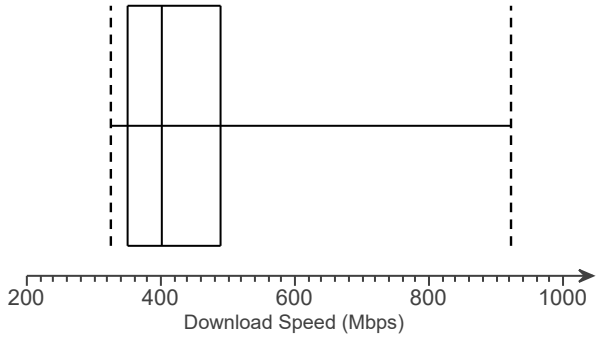
2: Download speeds

City	State	Download Speed	Providers
Akron	Indiana	525.62	13
Ambler	Pennsylvania	354.45	18
Bala Cynwyd	Pennsylvania	380.29	20
Barto	Pennsylvania	544.97	13
Berlin	New Jersey	489.75	15
Berlin	Massachusetts	332.16	13
Bluemont	Virginia	838.48	13
Boydton	Virginia	416.34	12
Brentwood	Maryland	395.86	12
Bristow	Virginia	578.04	18
Brookshire	Texas	446.9	17
Buhler	Kansas	414.29	13
Burleson	Texas	384.74	25
Carrollton	Ohio	342.62	10
Carver	Massachusetts	473	11
Chantilly	Virginia	351.93	25
Chelsea	Massachusetts	382.32	16
Cibola	Texas	360.82	17
Clifton	Virginia	573.31	17
Clinton	Maryland	578.31	13
Coatesville	Pennsylvania	333.02	16
College Grove	Tennessee	402.23	15
Dickenson Center	New York	461.26	8
Dublin	Virginia	395.56	18
East Elmhurst	New York	405.76	17
East Quoque	New York	363.22	9
El Segundo	California	367.3	25
Emerson	New Jersey	477.31	15
Fischer	Texas	335.53	13
Fort Lupton	Colorado	644.32	12
Fort Pierce	Florida	328.02	17
Foster	Rhode Island	452.09	10
Gibsonton	Florida	343.78	13
Grove	Oklahoma	364.14	13
Gurley	Alabama	658.93	14
Haddon Heights	New Jersey	499.06	15
Hamilton	New York	616.68	10
Hamilton	Virginia	340.94	12
Haverford	Pennsylvania	348.75	14
Hazel Crest	Illinois	385.99	14
Hoschton	Georgia	739.69	11
Independence	Ohio	685.6	23
Jenks	Oklahoma	347.6	14

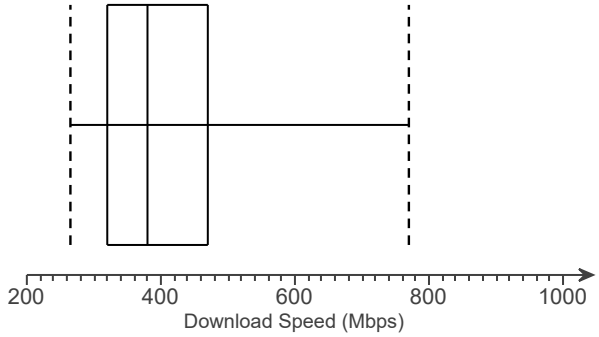
La Vernia	Texas	387.21	15
Lake Grove	New York	326.21	19
Lathop	Missouri	370.6	8
Mahwah	New Jersey	337.53	17
Manassas	Virginia	401.38	23
Medford	New Jersey	362.56	17
Millington	New Jersey	423.6	12
Montgomery	Illinois	488.29	19
Mukilteo	Washington	406.39	15
New Windsor	New York	357.21	14
Newtonville	Massachusetts	334.51	15
Nine Mile Falls	Washington	922.39	18
North Arlington	New Jersey	660.18	15
North Miami	Florida	334.99	18
Norwood	New Jersey	376.98	14
Oakton	Virginia	429.26	18
Ocean View	New Jersey	335.13	14
Orinda	California	417.59	14
Pacific Grove	California	392.76	10
Pacifica	California	346.39	12
Pebble Beach	California	325.34	10
Piedmone	Oklahoma	662.01	13
Pikesville	Maryland	527.95	19
Pleasantville	New York	346.56	14
Poolesville	Maryland	503.27	13
Prospect Park	Pennsylvania	392.64	15
Rancho Santa	California	461.85	18
Red Bank	New Jersey	429	17
Reisterstow	Maryland	540.39	17
Ripon	California	327.77	16
Roanoke	Texas	454.03	21
Round Hill	Virginia	340.85	11
Rumson	New Jersey	680.11	10
Santa Fe	Texas	366.37	12
Sapulpa	Oklahoma	491.89	15
Short Hills	New Jersey	325.54	16
Skaneatetes	New York	418.24	12
Skippack	Pennsylvania	531.58	11
Sorrento	Florida	333.36	16
Spicewood	Texas	446.22	23
Stanford	California	334.52	18
Stow	Massachusetts	440.11	13
Sugar Grove	Illinois	404.98	17
Tomball	Texas	327.11	21
Triangle	Virginia	343.6	14
Tulia	Texas	353.94	9
Turners Falls	Massachusetts	401.31	9
Washington	Virginia	520.28	9
Water Mill	New York	378.58	10
Waxahachie	Texas	480.48	21
West Brookfield	Massachusetts	422.49	13
West Friendship	Maryland	406	11

City	State	Download Speed	Providers
Wheeling	West Virginia	509.06	13
Wynnewood	Pennsylvania	352.27	18

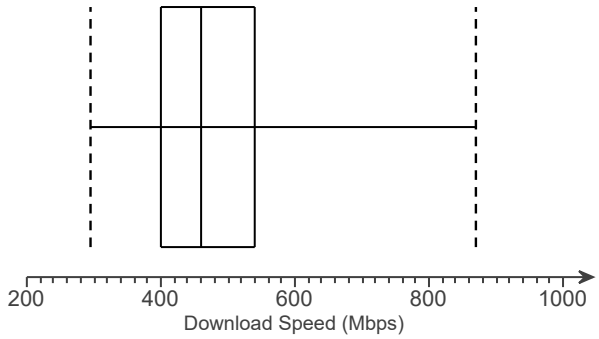
3: Boxplot d



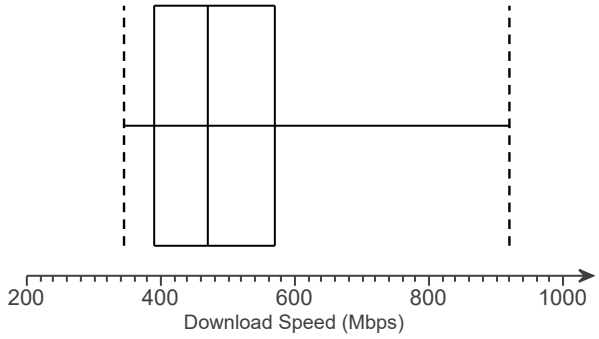
4: Boxplot c



5: Boxplot b



6: Boxplot a



7. Which of the following statistics is not a measure of central tendency?

- **A.** Q_3
- **B.** mode
- **C.** arithmetic mean.
- **D.** median

8. In a right-skewed distribution, _____.

- **A.** the median is less than the arithmetic mean
- **B.** the median is greater than the arithmetic mean
- **C.** the median equals the arithmetic mean
- **D.** None of the above.

9. In a perfectly symmetrical bell-shaped "normal" distribution, _____.

- **A.** the arithmetic mean equals the median
- **B.** the arithmetic mean equals the mode
- **C.** the median equals the mode
- **D.** All of the above.

10. The smaller the spread of scores around the arithmetic mean, _____.

- **A.** the smaller the coefficient of variation
- **B.** the smaller the standard deviation
- **C.** the smaller the interquartile range
- **D.** All of the above.