# STAT2361
# Midterm Exam

We’am A Rostom

توكلت على الله

35/35

**Birzeit University**
**Mathematics Department**
**First Semester 2019/2020**
**STAT2361 – Midterm Exam**

Name (بالعربية): ..

Student No.: ..

Excellent

**Circle your class number.**

| Class Number | Instructor Name | | Classes Time | |
|---|---|---|---|---|
| 1 | Hani Kabajah | T, R | 11:25 - 12:40 | SCI113 |
| 2 | Maher Abdallatif | M | 10:00 - 11:15 | SCI012 |
| | | W | 10:00 - 11:15 | SCI114 |
| 3 | Maher Abdallatif | M, W | 11:25 - 12:40 | SCI116 |
| 4 | Hani Kabajah | T, R | 10:00 - 11:15 | SCI114 |
| 5 | Mohammad Madiah | M, W | 12:50 - 14:05 | SCI115 |
| 6 | Batool Raddad | T, R | 12:50 - 14:05 | SCI021 |
| 7 | Mohammad Madiah | T, R | 14:15 - 15:30 | SCI116 |
| 8 | Batool Raddad | M, W | 14:15 - 15:30 | SCI214 |
| 9 | Mahmoud Ghannam | T, R | 12:50 - 14:05 | SCI213 |

**Circle the most correct answer.**

1) The following are stock prices for a certain stock.

| | | | | |
|---|---|---|---|---|
| 13 | 25 | 45 | 32 | 43 |

What is the sample standard deviation?

13 , 25 , 32 , 43 , 45

a. 11.83
b. 31.6
c. 13.22
d. 139.84

2) In a certain bell-shaped population the mean salary was 4500 and the standard deviation was 275. What is the percentage elements that are between the salaries 3950 and 5325?

$M = 4500$
$\sigma = 275$

$Z(3950) = \frac{3950 - 4500}{275} = -2$

a. Approximately 68 %
b. Approximately 81.5 %
c. Approximately 47.5 %
d. Approximately 97.5 %

3) The city where a company is located has the

$Z(5325) = \frac{5325 - 4500}{275} = 3$

a. nominal scale of measurement
b. ordinal scale of measurement
c. interval scale of measurement
d. ratio scale of measurement

almost the all

.95 .025

-3 -2 2 3

.025 .95

4) Let the random variable $x$ has the following probability distribution.

| $x$ | 2 | 3 | 5 | 7 |
|---|---|---|---|---|
| $f(x)$ | 0.12 | 0.38 | 0.40 | 0.1 |

Then, the standard deviation $\sigma$ is equal to

a. 1.92
b. 1.47
c. 2.22
d. 0.16

5) For the following data, find the sample variance of the variable $y$.

| $x$ | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| $y$ | 1 | 1 | 2 | 4 |

a. $s_y^2 = 2$
b. $s_y^2 = 1.5$
c. $s_y^2 = 1.67$
d. $s_y^2 = 1.25$

6) One of the following is a measure of distribution shape:

a. The median
b. The correlation coefficient
c. The standard deviation
d. The skewness

7) If the estimated regression equation is given by $\hat{y} = 100 + 20x$. Then, the estimated value of $y$ at $x = 3$ is equal to:

a. 100
b. 20
c. 160
d. 60

8) If $A$ and $B$ are mutually exclusive events, then

a. $P(A|B) = P(A)$
b. $P(B|A) = P(B)$
c. $P(A \cap B) = P(A).P(B)$
d. $P(A \cap B) = 0$

9) The years of experience of an employee has the

a. nominal scale of measurement
b. ordinal scale of measurement
c. interval scale of measurement
d. ratio scale of measurement

10) Let the random variable $x$ has the following probability distribution.

| $x$ | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| $f(x)$ | 0.22 | ? | 0.40 | 0.04 |

Then, $P(x = 1)$ is equal to

$\Sigma F(x) = 1$

$F(1) = .34$

a. 0.22
b. 0.34
c. 0.56
d. 0.44

11) The data given below were taken from a study about smoking. The table below indicates the numbers of people in the study according to their gender and smoking habits. A randomly individual is selected, what is the probability that the individual is a man or a smoker?

$P(\text{man} \cup \text{smoker}) = P(\text{man}) + P(\text{smoker}) - P(A \cap B)$

| | *Smokers* | *Nonsmokers* | *Total* |
|---|---|---|---|
| *Men* | 300 | 150 | 450 |
| *Women* | 100 | 450 | 550 |
| *Total* | 400 | 600 | 1000 |

a. 0.4000
b. 0.3000
c. 0.4500
d. 0.5500

$= \left(\frac{450}{1000}\right) + \left(\frac{400}{1000}\right) - \left(\frac{300}{1000}\right)$

$= (.45 + .4) - (.3)$

$= .55$

12) One of the following is a measure of variability:

a. The mean
b. The covariance
c. The variance
d. The skewness

vary
var
variance
C.V

13) How many password of length 4 can we construct using the 26 letters of the English alphabet?

a. 358 800
b. 456 976
c. 14 950
d. 104

14) If $P(A) = 0.80$, $P(B) = 0.70$, and $P(A \cap B) = 0.65$, then $P(A^c)$ is equal to

$P(A^c) = 1 - P(A)$

$= 1 - .80$

$= .20$

a. 0.15
b. 0.20
c. 0.30
d. 0.35

15) Let the random variable $x$ has the following probability distribution.

| $x$ | 2 | 3 | 5 | 7 |
|---|---|---|---|---|
| $f(x)$ | 0.12 | 0.38 | 0.40 | 0.1 |

Then, the expected value $E(x)$ is equal to

a. 4.25
b. 4
c. 4.08
d. 0.25

16) Let the random variable $x$ has the following probability distribution.

| $x$ | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| $f(x)$ | 0.25 | 0.19 | 0.49 | 0.07 |

Then, $P(x \leq 2)$ is equal to

$P(x \leq 2) = P(0) + P(1) + P(2)$
$= .25 + .19 + .49$
$= .93$

a. 0.25
b. 0.44
c. 0.93
d. 0.07

17) In a certain company 45% of the employees are females. A random sample of 10 employees is taken. What is the probability of exactly 2 female employees?

$P(\text{Female}) = .45$
$n = 10$
$P = \binom{10}{2}(.45)^2(.55)^8 = 45(.2025)(8.3 \times 10^{-3}) = .07630$

a. 0.2025
b. 0.9000
c. 0.0229
d. 0.0763

18) In how many ways can we select 6 students from a group of 40 students?

$C_6^{40} = 3,838,380$

a. 2 763 633 600
b. 3 838 380
c. 4 096 000 000
d. 240

19) If $A$ and $B$ are independent events, then

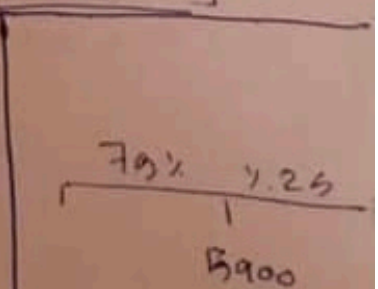
$P(A|B) = P(A)$
$P(A \cap B) = P(A) \cdot P(B)$

a. $P(A|B) = 0$
b. $P(B|A) = 0$
c. $P(A \cap B) = P(A).P(B)$
d. $P(A \cap B) = 0$

20) In a certain population, the first quartile for salaries was 2700, the second quartile was 4700, and the third quartile was 5900. What is percentage of the data is less than 5900?

$25\% = Q_1 = 2700$
$50\% = Q_2 = 4700$
$75\% = Q_3 = 5900$

a. Approximately 25 %
b. Approximately 50 %
c. Approximately 75 %
d. Approximately 100 %



21) The following are stock prices for a certain stock.

| 13 | 29 | 45 | 32 | 43 |
|---|---|---|---|---|

What is the 65th percentile? 13, 29, 32, 43, 45

a. 32
b. 43
c. 45
d. 25

$i = \frac{66}{100} * 5$ $\Rightarrow$ $Y_4 = 43$

$i = 3.25 \Rightarrow i = 4$

22) One of the following is a discrete random variable:

a. The amount of liquid filled in a bottle
b. The balance of a bank account
c. The number of employees who finished a training course
d. The profit of a project

23) In a certain bank 35% of the customers are small business owners. A random sample of 20 customers is taken. What is standard deviation for the number of customers who are small business owners?

P(small Bus.) = .35
n = 20
np = 7

a. 7
b. 4.55
c. 13
d. 2.13

$= np(1-p)$
$(20)(.35)(1-.35) = 4.55$

24) In a certain population the mean salary was 4750 and the standard deviation was 475. What is the z-score of the salary 5800?

$\bar{x} = 4750$
$s = 475$

a. 2.21
b. 1.12
c. 0.74
d. 0.92

$z(5800) = \frac{5800 - 4750}{475} = 2.21$

25) If $P(A) = 0.80$, $P(B) = 0.70$, and $P(A \cap B) = 0.65$, then $P(A \cup B)$ is equal to

a. 0.70
b. 0.65
c. 0.85
d. 0.80

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$
$= .8 + .7 - .65$
$= 1.5 - .65$
$= .85$

26) For a certain stock, the mean of the stock prices was 230 and the variance was 1225. What is the coefficient of variation?

$\bar{x} = 230$

a. 18.78 %
b. 532.61 %
c. 15.22 %
d. 657.14 %

$s^2 = 1225 \Rightarrow s = 35$

$CV = \frac{s}{\bar{x}} * 100\% \Rightarrow \frac{35}{230} * 100\%$

27) In a certain country 55% of all employees are males. A random sample of 100 employees is taken. What is expected number of male employees?

P(males) = .55
n = 100

a. 45
b. 55
c. 24.75
d. 4.97

$E(x) = n \times p \Rightarrow 100 \times .55 = 55$

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30/30

Birzeit University
Mathematics Department
Summer semester 2018/2019
STAT2361- Test 1

Name : Weam Rostam. Students Number: 1[redacted]

Question (1). Circle the most correct answer.

1) One of the following is a graphical presentation of the cumulative distribution:
   a) Histogram
   b) Ogive
   c) Pie chart

2) One of the following is a measure of the distribution shape
   a) Mode
   b) Standard deviation
   c) Skewness

3) If $r_{xz} = -0.95$, then the value of $r_{xz}$ indicates
   a) A strong positive linear relationship between x and z
   b) A strong negative relationship between x and z
   c) A weak negative linear relationship between x and z

4) Scatter diagram is a graphical presentation of the relationship between
   a) Two quantitative variables
   b) Two qualitative variables
   c) qualitative variable and quantitative variable

Table(1) A survey of a sample of 125 employees.

| | Gender | | |
|---|---|---|---|
| Salary( $) | male | female | total |
| 800-899 | 18 | 30 | 48 |
| 900 -999 | 17 | 15 | 32 |
| 1000-1099 | 10 | 10 | 20 |
| 1100-1199 | 20 | 5 | 25 |
| total | 65 | 60 | 125 |

5) Refer to table (1). Salaries data can be classified as
   a) Interval data
   b) Ordinal data
   c) Ratio data

33) The following are stock prices for a certain stock.

| 13 | 25 | 45 | 32 | 43 |
|---|---|---|---|---|

What is the median?

13, 25, 32, 43, 45

a. 32
b. 43
c. 45
d. 25

34) The data given below were taken from a study about smoking. The table below indicates the numbers of people in the study according to their gender and smoking habits. If a woman is selected, what is the probability that she a smoker?

| | *Smokers* | *Nonsmokers* | *Total* |
|---|---|---|---|
| *Men* | 300 | 150 | 450 |
| *Women* | 100 | 450 | 550 |
| *Total* | 400 | 600 | 1000 |

$P(\text{sm}/\text{woman}) = \frac{P(W \cap S)}{P(W)} = \frac{\frac{100}{1000}}{\frac{550}{1000}} = \frac{.1}{.55}$

a. 0.2500
b. 0.1818
c. 0.1000
d. 0.4000

35) Consider the following frequency distribution. What is the sample standard deviation?

s

| Class | Midpoint | Frequency |
|---|---|---|
| 4 – 12 | 8 | 12 |
| 13 – 21 | 17 | 15 |
| 22 – 30 | 26 | 18 |
| 31 – 39 | 35 | 25 |

a. 11.62
b. 10.06
c. 9.93
d. 10.00

28) The following are stock prices for a certain stock.

| | | | | |
|---|---|---|---|---|
| 13 | 25 | 45 | 32 | 43 |

What is the sample mean? 13, 25, 32, 43, 45

a. 11.83
b. 31.6
c. 13.22
d. 139.84

29) For the following data, find the estimated regression equation.

| | | | | |
|---|---|---|---|---|
| $x$ | 1 | 4 | 6 | 7 |
| $y$ | 15 | 18 | 22 | 34 |

a. $\hat{y} = -1.52 + 0.27x$
b. $\hat{y} = 0.27 - 1.52x$
c. $\hat{y} = 10.14 + 2.69x$
d. $\hat{y} = 2.69 + 10.14x$

$\hat{y} = b_0 + b_1 x$

$b_0 = A = 10.14$

$b_1 = B = 2.69$

$\hat{y} = 10.14 + 2.69x$

30) If $r_{xy} = -0.98$, then

a. there is a strong positive linear relationship between $x$ and $y$
b. there is a strong negative linear relationship between $x$ and $y$
c. there is a weak positive linear relationship between $x$ and $y$
d. there is a weak negative linear relationship between $x$ and $y$

31) For the following data, find the sample covariance.

| | | | | |
|---|---|---|---|---|
| $x$ | 1 | 2 | 3 | 4 |
| $y$ | 1 | 1 | 2 | 4 |

a. $s_{xy} = 0.91$
b. $s_{xy} = 1.29$
c. $s_{xy} = 1.66$
d. $s_{xy} = 1.41$

$S_{xy} = r_{xy} * S_x * S_y$

$(.91)(1.29)(1.4)$

$= 1.643$

32) Consider the following frequency distribution. What is the sample mean?

| Class | Midpoint | Frequency |
|---|---|---|
| 4 – 12 | 8 | 12 |
| 13 – 21 | 17 | 15 |
| 22 – 30 | 26 | 18 |
| 31 – 39 | 35 | 25 |

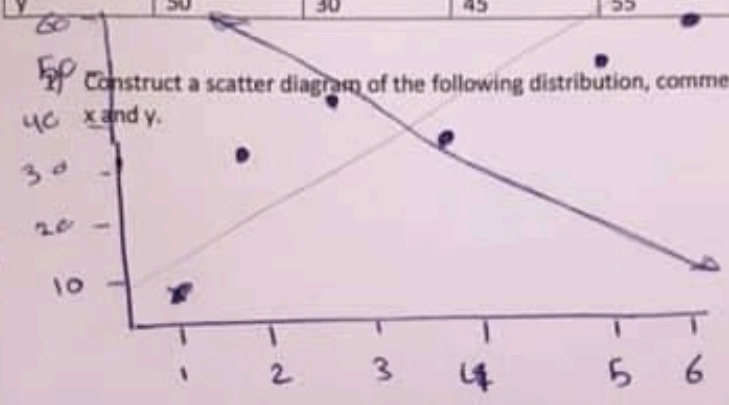
a. 21.5
b. 17.5
c. 24.2
d. 18.57

7

**Question (4).** Consider the following sample data

| x | 5 | 2 | 3 | 6 | 4 | 1 |
|---|---|---|---|---|---|---|
| y | 50 | 30 | 45 | 55 | 35 | 5 |

1) Construct a scatter diagram of the following distribution, comment on the relationship between x and y.




+ve
negative relationship
which when x increase
y decresing

2) Find the mean of the variable x

$\bar{x} = 3.5$

3) Find the standard deviation of the variable y

$S_y = 18.07$

4) Compute the sample correlation coefficient $r_{xy}$

$r_{xy} = \frac{S_{xy}}{S_x * S_y} \Rightarrow .89$

5) Find the estimated regression equation $\hat{y} = b_0 + b_1 x$

$b_0 = 6.67$

$b_1 = 8.57$

$\Rightarrow \hat{y} = 6.67 + 8.57x$

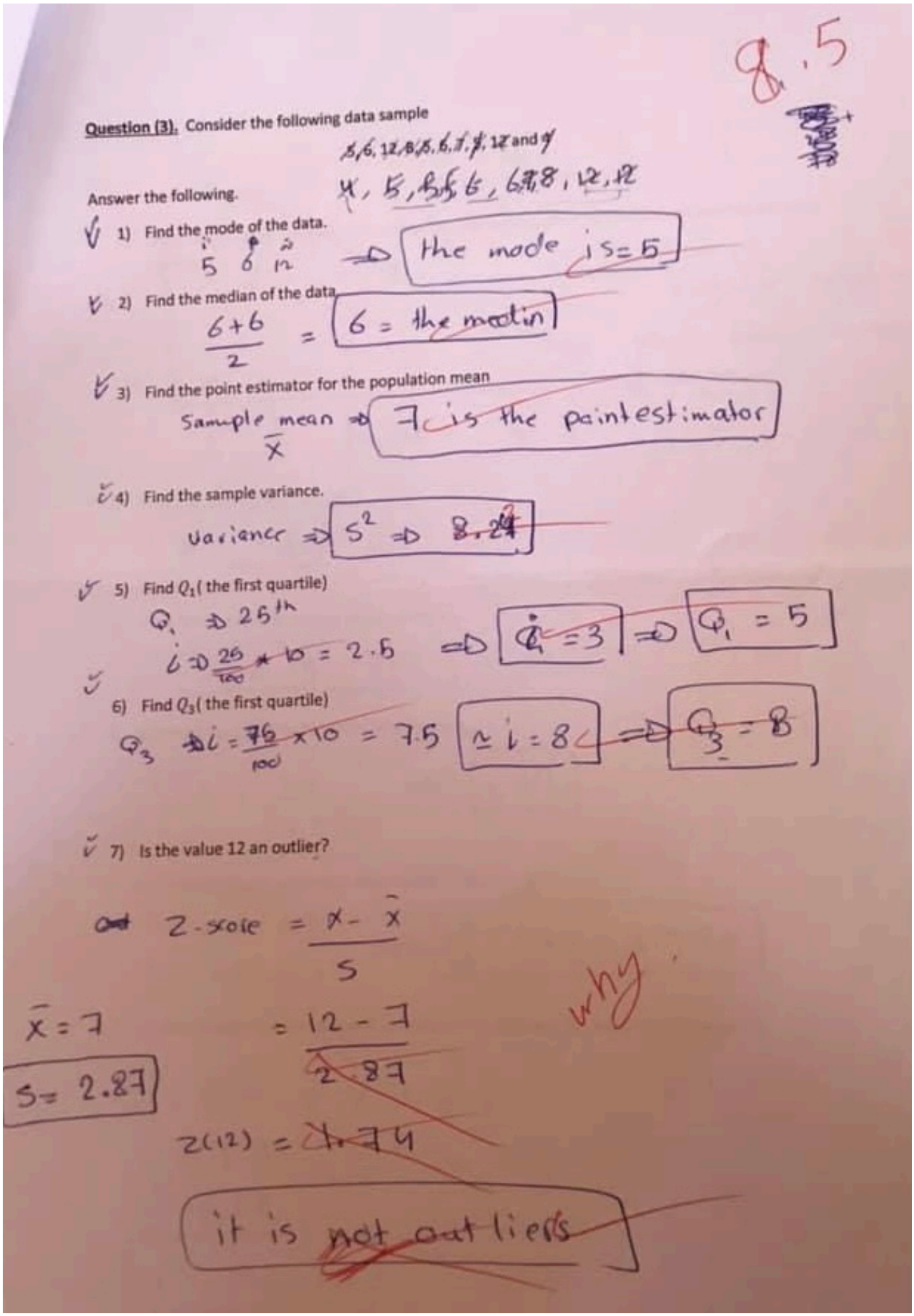
6) Use the estimated linear regression equation to estimate the value of y when x= 1.5

$\hat{y} = 6.67 + 8.57x$

$= 6.67 + (8.57 * 1.5)$

$6.67 + 12.86$

$\hat{y} = 19.53$



Question (3). Consider the following data sample

5, 6, 12, 8, 5, 6, 7, 4, 12 and 4

4, 5, 5, 6, 6, 7, 8, 12, 12

Answer the following.

1) Find the mode of the data.

5 6 12 ⇒ the mode is = 5

2) Find the median of the data.

$\frac{6+6}{2}$ = 6 = the median

3) Find the point estimator for the population mean

Sample mean $\bar{x}$ ⇒ 7 is the point estimator

4) Find the sample variance.

variance ⇒ $S^2$ ⇒ 8.24

5) Find $Q_1$ (the first quartile)

$Q_1$ ⇒ 25th

$i = \frac{25}{100} * 10 = 2.5$ ⇒ $Q_1 = 3$ ⇒ $Q_1 = 5$

6) Find $Q_3$ (the first quartile)

$Q_3$ ⇒ $i = \frac{75}{100} \times 10 = 7.5$ ≃ $i = 8$ ⇒ $Q_3 = 8$

7) Is the value 12 an outlier?

Z-score $= \frac{x - \bar{x}}{S}$

why

$\bar{x} = 7$

$= \frac{12 - 7}{2.87}$

S = 2.87

Z(12) = 1.74

it is not outliers

6) Refer to table (1). The variable salary is
   a) Quantitative variable
   b) Qualitative variable

7) The percentage of male employees is
   a) 52 %
   b) 48 %
   c) 20 %

8) The set of measurements obtained for a particular element is
   a) Observation
   b) Element
   c) Census

n = 20

**Question (2).** Consider the following data for a sample of 20 students

| class | Relative frequency | F | mid point |
|---|---|---|---|
| 10 – 19 | 0.1 | 2 | 14.5 |
| 20 – 29 | 0.3 | 6 | 24.5 |
| 30 – 39 | 0.45 | 9 | 34.5 |
| 40 - 49 | .15 | 3 | 44.5 |
| Total | 1 | 20 | |

Answer the following

1) What is the frequency of the class 30 – 39 ?

$R.F = \frac{F}{n} \Rightarrow .45 * 20 = F \Rightarrow F = 9$

$4.5 \times 2 = f$

2) What is the relative frequency of the class less than or equal 29 ?

$\geq 29 \Rightarrow .1 + .3 \Rightarrow R.F \geq 29 \Rightarrow RF \leq .4$

3) What is the proportion of the class 40 – 49?

$Proportion = 1 - (.45 + .3 + .1) \Rightarrow .15$

4) What is the percentage of the class 10 – 19?

$P.F.D = \frac{F}{n} * 100\% = .1 \times 100 \Rightarrow 10\%$

5) What is the width of each class?

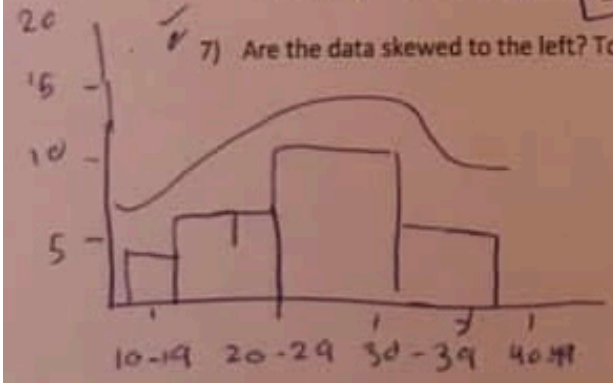
The width $\Rightarrow$ 10

20 – 10

6) What is the mean of the data?

$mi \cdot F \; m_i \Rightarrow$ 31

7) Are the data skewed to the left? To the right? Or symmetric?




Skewed to the left

mean less than median.