Sheet (1)

Q1: If three supermarkets are selling a chocolate bar for 1.25 JD, five are selling it for 1.50 JD, and ten are selling it for 1.15 JD, then the median price of the chocolate bar is:-

x	1.15	1.25	1.50	sum
f	10	3	5	18
C.f	10	13	18	
	(1−10)	(~~11~~ − 13)	(14−18)	

$$Q_2 = \left(\frac{n}{2}\right)^{th} = \left(\frac{18}{2}\right)^{th} = (9^{th} + 10^{th}) \div 2 \rightarrow (1.15 + 1.15) \div 2 = 1.15$$

Q2: On an exam given to 5 (n) students, the mean grade is 78, the grades of 4 of them are 87, 81, 76 and 53. Then the grade of the 5th student is:

$$\bar{x} = 78 \Rightarrow \bar{x} = \frac{\sum x}{n} \Rightarrow 78 = \frac{87 + 81 + 76 + X + 53}{5} \rightarrow X = 93$$

Q3: In quiz, 3 students got 1, 5 students got 2 and 2 student got 5. The average ($\bar{x}$) score of these student in this quiz is:

$$\bar{x} = \frac{\sum fx}{\sum f} = \frac{3(1) + 5(2) + 2(5)}{10} = \frac{23}{10} = 2.3$$

Q4: If the mean of 9 students is 15, a new student joined the class with mark 20, Find the new sum, new number of students and new mean.

$\boxed{n=9}$ $\bar{x} = 15 \rightarrow \sum x = n \cdot \bar{x} = 9(15) = 135$

new $\sum x = (135 + 20) = (155)$ / New $n = 10$ / New $\bar{x} = \frac{\text{New } \sum x}{\text{New no.}}$

$$\text{New } \bar{x} = \frac{(155)}{10} = 15.5$$

Q5: The value of the mean ($\bar{x}$) times the number (n) of observations equal=

A) The median B) the sum of the data C) The mode D) IQR ordered data بالترتيب

Q_6: If the median of observations 0, 3, x, 12 is 5, then the mean of these observations will be:

$\boxed{Q_2 = 5}$ $\left(\frac{n}{2}\right)^{th} = \left(\frac{4}{2}\right)^{th} = \frac{(2^{nd} + 3^{rd})}{2} = \frac{3+x}{2} = 5 \rightarrow 3 + x = 10$

$\boxed{x = 7} \Rightarrow \bar{x} = (0+3+7+12) \div 4 = \frac{22}{4} = \frac{11}{2} = 5.5$

Q_7: Consider the following data:

I	$\boxed{3-5}$	6-8	9-11	12-14
F	5	2	2	1

Then the mode is: Modal class (3-5) → mode $= \frac{5+3}{2} = 4$ (midpoint)

Q_8: Consider the following grouped sample data.

I	0-4	5-9	10-14	15-19	sum
f	2	3	5	2	12
x	2	7	12	17	
fx	4	21	60	34	119

Then the mean is:

$\bar{x} = \frac{\sum fx}{\sum f} = \frac{119}{12} = 9.916 \approx 9.92$

Q_9: The average salary of 15 male employees is 550 JD, and the average salary of 10 female employees is 420 JD, then the average salary among all these employees is:

male: $n = 15$ / $\bar{x} = 550 \rightarrow \sum x = n \cdot \bar{x} = 8250$

female: $n = 10$ / $\bar{x} = 420 \rightarrow \sum x = 4200$

All: $n = 25$ / $\sum x = 12450$ / $\Rightarrow \bar{x} = \frac{\sum x}{n} = \frac{12450}{25} = 498$

Q_{10}: If the mean of 15, x, 2x+3 is 33, then the value of x is

$\bar{x} = \frac{15 + x + 2x + 3}{3} = 33 \rightarrow 3x = 81 \rightarrow x = 27$

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Q_{11}: From January to September, the mean number of car accidents per month was 630. From October to December, the mean was 1350 accidents per month. The mean number of car accidents per month for the whole year was:

JANUARY (1) to September (9) $\rightarrow \bar{x} = 630 \rightarrow \sum x = \overset{(9)}{n} \cdot \bar{x} = \boxed{5670}$

October (10) to December (12) $\rightarrow \bar{x} = 1350 \rightarrow \sum x = 3(1350) = \boxed{4050}$

for the Whole year was: $\boxed{n = 12}$ & $\sum x = 9720 \Rightarrow \bar{x} = \frac{9720}{12} = \boxed{810}$ ✓

Q_{12} The mean of 50 observations is 85. If an observation was incorrectly recorded 150 instead of 15, then the correct mean equals?

$\boxed{n = 50} \rightarrow \boxed{\bar{x} = 85}$ $[(150 - 15) = 135]$

(old) $\sum x = 50(85) = \boxed{4250}$

New $\sum x = 4250 - 135 = \boxed{4115} \rightarrow \bar{x} = \frac{4115}{50} = 82.3$

Q_{13}: The grades of 15 students have mean 40. if the grade of a student is changed from 42 to 48, the new mean is =

$\boxed{n = 15}$ / $\boxed{\bar{x} = 40} \rightarrow \sum x = 600 \Rightarrow$ New $\sum x = 600 + 6$

New $\bar{x} = \frac{\sum x}{n} = \frac{606}{15} = 40.4$

Q_{14}: Let 8 be the median of the observations

even $x, 9, 7, 1, 1, 11, 2, 14$. then an acceptable value of x is:

A) 8 B) 7 C) 10 D) 6 E) 5

n: even $\Rightarrow \left(\frac{n}{2}\right)^{th} = \frac{\left(\frac{n}{2}\right)^{th} + \left(\frac{n}{2}+1\right)^{th}}{2} = \frac{4^{th} + 5^{th}}{2} = 8$

$\underbrace{1, 1, 2}_{\text{3 قيم}}, \boxed{7, \overset{*}{} 9}, \underbrace{11, 14 \_\_}_{\text{كبار يكونوا 3 قيم}}$ x هنا $\Rightarrow x > 9$

so, an acceptable value of x is 10

COLLEGE

Q_{15}: For the following data $(9, -3, \overset{(5)}{x}, \overset{(8)}{x+3}, 11)$ the mean is 6, then the median is:

$$\bar{X} = \frac{9 + \cancel{-3} + x + x + \cancel{3} + 11}{5} = 6 \rightarrow 2x = 10 \rightarrow x = 5$$

the median : $Q_2 = \left(\frac{n}{2}\right)^{th} = \frac{5}{2} = 2.5$ [fraction] → Not Integer

3^{rd} value

order data: $\cancel{-3}, \cancel{5}, \overset{Q_2}{\boxed{8}}, \cancel{9}, \cancel{11}$ → $Q_2 = 8$

Q_{16}) If the mean of the following observations is 3 $(4, 0, 8, x, 1)$, the median is:

$$\bar{X} = \frac{4 + 8 + x + 1}{5} = 3 \rightarrow \boxed{x = 2}$$

order data: $\cancel{0}, \cancel{1}, 2, \cancel{4}, \cancel{8}$ → $Q_2 = 2$

Q_{17}) The marks of 8 students are given as follows:
6, 3, 9, 10, 8, 4, 8, 9. A ninth student also takes the test, then the median will:

A) Increase to 10 B) Increase to 9
C) Decrease to 7 D) Remain 8
E) Decrease to 6

order data: $\cancel{3}, \cancel{4}, \cancel{6}, \boxed{8\ 8}, \cancel{9}, \cancel{9}, \cancel{10}$

$$Q_2 : \frac{8+8}{2} = 8 \rightarrow Q_2 = 8$$

اذا ضفنا العلامة التاسعة وكانت

$\cancel{3}, \cancel{4}, \cancel{6}, \cancel{8}, \overset{Q_2}{\boxed{8}}, \cancel{9}, \cancel{9}, \cancel{10}, \cancel{x}$ ← الاحتمال الاول اكبر من 8

$\cancel{x}, \cancel{3}, \cancel{4}, \cancel{6}, \boxed{8}, \cancel{8}, \cancel{9}, \cancel{9}, \cancel{10}$ ← الاحتمال الثاني اقل من 8

$\cancel{3}, \cancel{4}, \cancel{6}, \cancel{8}, \underset{Q_2}{\boxed{8}}, \cancel{8}, \cancel{9}, \cancel{9}, \cancel{10}$ ← الاحتمال الثالث يساوي 8

يبقى الـ median كما هو (8)

Q_{18}: The table below shows the marks gained in a test by a group of students

Mark	1	2	3	4	5	sum
frequency	5	12	K	6	2	25+K
C.f	5	17	17+K	23+K	25+K	
	(0 — 5)	(6 — 17)	(18 — 17+K)			

The median is 3 and the mode is 2, the possible values of k are:

A) 11 and 12 B) 8, 9 and 10

C) 8 and 9 D) 9 and 10

E) 10 and 11

* The mode is 2 → so, $k < 12$

* $\boxed{Q_2 = 3}$

$Q_2 = \frac{n}{2} = \frac{25+k}{2} > 17$

$\rightarrow k > 9$

so $9 < k < 12$

نختبر $k = 10 \Rightarrow \frac{25+10}{2} = 17.5$ [fraction] → Nex integer

$(18)^{th}$ value $\Rightarrow \underline{3}$ ✓

نختبر $k = 11 \Rightarrow \frac{25+11}{2} = \frac{(18)^{th} \text{ value} + (19)^{th}}{2} = \frac{3+3}{2} = 3$ ✓

∴ $K = 10$ and 11

Sheet (2)

Q1 : The following is the age distribution for a random sample of 20 school students.

Age in years (x)	$\boxed{10}$	12	15	$\boxed{18}$	Sum
Frequency	2	6	7	5	20

The range of the 20 ages in this sample is :

$R = 18 - 10 = 8$

Q2 : The 60^{th} percentile of the data presented in table is:

Class	Frequency	C.f	U.B.B
8 - 12	7	7	12.5
13 - 17	12	19	17.5
18 - 22	10	29 *	22.5 *
23 - 27	8	37	27.5
28 - 32	3	40	32.5

$60^{th} = \left(\frac{60\,n}{100}\right)^{th} = \left(\frac{60\,(40)}{100}\right)^{th} = (24^{th})$

19 24 29

$\frac{24-19}{29-19} = \frac{60^{th} - 17.5}{22.5 - 17.5}$

17.5 60^{th} 22.5

$\Rightarrow \frac{5}{10} = \frac{60^{th} - 17.5}{5} \Rightarrow 60^{th} = 20$

Q3 : Consider the following frequancy table of 20 observations:

Class	Frequency	C.f	U.R.B
1 - 10	4	4	10.5
11 - 20	6	10	20.5
21 - 30	8	18 *	30.5 *
31 - 40	2	20	40.5

The no. of observations such that each one of them →

COLLEGE

has value greater than 24.25 is

$$\frac{x-10}{18-10} = \frac{24.25-20.5}{30.5-20.5}$$

10   x   18

20.5 $\boxed{24.25}$ 30.5

Q_k

$$\frac{x-10}{8} = \frac{3}{8}$$

$x-10=3 \rightarrow \boxed{x=13} \rightarrow$ less than 24.25

~~$P_k = \left(\frac{kn}{100}\right)^{th} \Rightarrow P_k = \left(\frac{k(30)}{100}\right)^{th} = (13)^{th} \Rightarrow \frac{3k}{10} = 30 \rightarrow k = 130$~~

but the no. of observation greater than 24.25 is

$20-13 = 7$

Q4: If the range is 30, then the range of y after coding $Y = -2X+3$ will be:

Range ([illegible]) $\Rightarrow R = |-2|(30) = 60$

Q5: Find 66^{th} percentile of this sample data (as shown in the following picture)

Grade	3	8	$\boxed{13}$	18
Frequency	3	6	7	4
c.f	3	9	* 16	20
	(1-3)	(4-9)	(10-16)	

$66^{th} = \left(\frac{66\,n}{100}\right)^{th} = \left(\frac{66(20)}{100}\right)^{th} = (13.2)^{th} \rightarrow (14)^{th}$ value

Fraction

$\boxed{P_{66} = 13}$

Q6 Consider the following data:

Grade	1	2	3	4	5
Frequency	6	5	3	3	3

The 40% to 70% inter-percentile-range is:

* IPR = $P_{70} - P_{40}$

c.f	6	11	14	17	20
	(1-6)	(7-11)	(12-14)	(15-17)	(18-20)

$P_{40} = \left(\frac{40(20)}{100}\right)^{th} = \frac{(8)^{th} + (9)^{th}}{2} = \frac{2+2}{2} = \boxed{2}$

$P_{70} = \left(\frac{70(20)}{100}\right)^{th} = \frac{(14)^{th} + (15)^{th}}{2} = \frac{3+4}{2} = \boxed{3.5}$

$P_{70} - P_{40} = 3.5 - 2 = 1.5$

Q7) For the following grouped frequency distribution

Class	0-5	6-11	12-17	18-23
Frequency	2	8	7	3

The number of observations that lies below 21.5 is:

c.f	2	10	17	* 20
U.B.B	5.5	11.5	17.5	* 23.5

$\frac{x-17}{20-17} = \frac{21.5-17.5}{23.5-17.5}$ 17 $\boxed{x}$ 20

$\frac{x-17}{3} = \frac{2}{3} \rightarrow x-17 = 2 \rightarrow$ 17.5 $\boxed{21.5}$ 23.5

* $\boxed{x = 19}$ no. of observation that lies below 21.5

Q_8: Consider the following data:

Grade	1	2	3	4	5
Freq.	6	5	3	3	3

The 70^{th} percentile (P_{70}) is:

c.f	6	11	14	17	20
		(7 − 11)	(12 − 14)	(15 − 17)	

$$P_{70} = \left(\frac{70\,(20)}{100}\right)^{th} = \frac{14^{th} + 15^{th}}{2} = \frac{3+4}{2} = \boxed{3.5}$$

Q_9: What is the interquartile range for the following set of numbers?

~~4~~, ~~5~~, ~~6~~, ~~8~~, $\boxed{9, 11}$, ~~13~~, ~~16~~, ~~16~~, $\boxed{18, 20}$, ~~21~~, ~~23~~, ~~30~~, $\boxed{31, 33}$, ~~36~~, ~~37~~, ~~40~~, ~~41~~.

$Q_1 = 10$ $\quad$ $Q_2 = 19$ $\quad$ $Q_3 = 32$

median

$$IQR = Q_3 - Q_1 = 32 - 10 = 22$$

Q_{10}: Consider the following data set:

($\boxed{24}$, 23, 29, 21, 20, 21, 21, $\boxed{25}$, 29, 22, 20, 21) The 25^{th} percentile is:

Arrange [accending]: 20, 20, 21, 21, 21, 22, 23, 24, 25, 29, 29.

3^{rd} 4^{th}

$\boxed{n = 12}$

$$P_{25} = \left(\frac{25\,(12)}{100}\right)^{th} = \frac{(3)^{rd} + (4)^{th}}{2} = \frac{21+21}{2} = 21$$

Q_{11}: The following is the age distribution for a random sample of 20 school students $\boxed{n = 20}$

Age in years (x)	10	12	15	18
F	2	6	7	5

The Third quartile Q_3 is:

c.f	2	8	15	20
	(1−2)	(3−8)	(9−15)	(16−20)

$\therefore Q_3 = 16.5$

$Q_3 = P_{75}$

$$\left(\frac{75\,(20)}{100}\right)^{th}$$

$$\left((15)^{th} + (16)^{th}\right) \div 2$$

$$\left((15) + (18)\right) \div 2$$

$$\therefore Q_3 = \frac{33}{2} = 16.5$$

COLLEGE

Q12: The age distribution of a sample of 30 Persons is as follows:

Age class	10-14	15-19	20-24	25-29	30-34
Freq.	3	7	10	7	3

The 90^{th} percentile:

c.f	3	10	20	$\boxed{27}$	30
U.R.B	14.5	19.5	24.5	29.5	34.5

90^{th} percentile: $P_{90} = \left(\frac{90(30)}{100}\right)^{th} = (27)^{th}$ value

is $29.5 = P_{90}$

Sheet (3)

Q_1: The following is the frequency table of a sample data. the first quartile $Q_1 = 7$ and the third quartile $Q_3 = 17$, the number of outliers in this sample is;

عدد ال
outliers

x	frequency
3	2
7	6
17	11
18	2
$\boxed{33}$	$\rightarrow$ 3 $\rightarrow$ no. of outliers

$IQR = Q_3 - Q_1 = 17 - 7 = \boxed{10}$

$(Q_1 - 1.5 IQR, \quad Q_3 + 1.5 IQR)$

$(7 - 1.5(10), \quad 17 + 1.5(10))$

$(7 - 15, \quad 17 + 15)$

$(-8, \quad 32)$

outliers $\rightarrow$ less than (-8) $\rightarrow$ لا يوجد

$\rightarrow$ ~~more~~ greater than (32) $\rightarrow$ (33) is an outlier

it was repeated 3 times $\rightarrow$ the no. of outliers is $\boxed{3}$

Q2 Given the sample data: -8, -6, 3, 4, 4, 6, 8, 10, 20, 26
All the outlier(s) for this sample data is (are)

A) 24, 26 B) -8, 26 C) -8, 24, 26
D) -8, -6 E) No outliers

$IQR = Q_3 - Q_1$

1 نلاحظ انّ الـ data مُرتبة ⇒ ترتيب data ⇒ -8, -6, 3, 4, 4, 6, 8, 10, 20, 26

$\boxed{Q_1 = 3}$ $\boxed{Q_2 = 5}$ $\boxed{Q_3 = 10}$

$IQR = 10 - 3 = 7$

$(Q_1 - 1.5(7) , Q_3 + 1.5(7))$

$(3 - 10.5 , 10 + 10.5) \Rightarrow (-7.5 , 20.5)$

(-8) less than -7.5 and (26) greater than 20.5

, so -8 & 26 are outliers

Q3) A sample of size 50 has a first quartile $Q_1 = 15$ and third quartile $Q_3 = 35$, some بعض of the observations are (1, 5, 23, 36, 55, 70), the possible outliers are:

A) 1 & 5 B) 55 & 70 C) 70 only D) 5 only

$\boxed{n = 50}$ $\boxed{Q_1 = 15}$ $\boxed{Q_3 = 35}$ $\Rightarrow IQR = 35 - 15 = 20$

$(15 - 1.5(20) , 35 + 1.5(20)) \Rightarrow (-15 , 65)$

∴ 70 is an outlier

Q4: Carlos recorded his friend's scores while playing the video game "Golden Eye Commander". Most of his friend's scores were between 9 and 12. One score, howevere, was 28, and Carlos identified it as an outlier. What should Carlos do with the score of 28 when recording this data?

A) Ignore the outlier since its so far from the average scores.
B) Ignore the outlier because he may have recorded the score incorrectly.
C) Eliminate the outlier and ask that friend to play again to obtain a new score.
D) Keep the outlier as it may help to explain a new strategy for playing the game.

COLLEGE

Q5) The areas of the 46 villages in Jordan, in square meters, are listed in order below. The areas range from 392 to 1228 with $Q_1 = 507$, $M = 660.5$, and $Q_3 = 795$, ... $\boxed{IQR = 288}$

According to the 1.5 X IQR rule, are there any potential outliers...?

$(Q_1 - 1.5\ IQR,\ Q_3 + 1.5\ IQR) \Rightarrow (507 - 1.5(288),\ 795 + 432)$

$(75,\ 1227)$

A) Yes, 392 and 1228 are potential outliers.

B) Yes, 1228 is a potential outlier. more than 1227

C) Yes, 1080, 1133, 1134, and 1228 are potential outliers.

Sheet (4)

Q1: A sample of 10 observations has mean = 30, standard deviation = 5, the sum of the squares is → $\sum x^2 = ??$

$\boxed{n = 10}$, $\boxed{\bar{x} = 30}$ $\boxed{s = 5}$ → $\sum x = n \cdot \bar{y} = 10(30) = 300$

$s^2 = \frac{\sum x^2}{n-1} - \frac{(\sum x)^2}{n(n-1)} \rightarrow 25 = \frac{\sum x^2}{9} - \frac{(300)^2}{10(9)} \rightarrow \sum x^2 = 9225$

Q2) The variance of the numbers 1, 1, 1, 3, 5 is: → $\boxed{n = 5}$

$x =$ 1, 1, 1, 3, 5 sum → $\boxed{\sum x = 11}$

$x^2 =$ 1, 1, 1, 9, 25 $\boxed{37}$ → $\sum x^2$

$s^2 = \frac{\sum x^2}{n-1} - \frac{(\sum x)^2}{n(n-1)} \rightarrow s^2 = \frac{37}{4} - \frac{121}{5(4)} = s^2 = \frac{16}{5} = 3.2$

Q3) If you are told a population has a mean of 25 and a variance of 0, what must you conclude?

$\boxed{\bar{x} = 25}$ $\boxed{s^2 = 0}$ → All the data are equal

A) Someone has made a mistake.

B) There is only one element in the population.

C) There are no elements in the population.

D) All the elements in the population are 25.

COLLEGE

Q4) For a certain data set. you told that the variance $S = 0$
What else can you say about the dataset?

A) Median = 0 B) Mean = 0 C) Range = 0 D) a+b

$S = 0 \rightarrow$ All the data values are equal $\rightarrow$ max = min

Range = max − min = $\underline{\underline{0}}$

Q5) In a sample of 10 students the grades have mean 60 and variance 36. If two students with grades 50 and 40 left the class, then the new sum of square of grades.

$\Sigma (x_i)^2 =$

$\boxed{n = 10}$ / $\boxed{\bar{x} = 60}$ / $\boxed{s^2 = 36}$ $\rightarrow$ $\boxed{\Sigma x = 600}$

New $\Sigma x = 600 - (40+50) = 600 - 90 = \boxed{510}$

Eq: $s^2 = \frac{\Sigma x^2}{n-1} - \frac{(\Sigma x)^2}{n(n-1)} \rightarrow 36 = \frac{\Sigma x^2}{9} - \frac{(600)^2}{10(9)} \rightarrow \Sigma x^2 = 36324$

New $\Sigma x^2 = 36324 - (40^2 + 50^2) = \cancel{32224}$ 32224

Q6) Consider the following sample data:

~~Σx = 8(3)~~ ← $\bar{x} = 9$

If the mean of this sum sample is 9, then $\boxed{10}$ the variance s^2 is:

Class	1 - 5	6 - 10	11 - 15	
f	2	4	4	
x	3	8	13	24
x^2	9	64	169	

$\Sigma f x = 90$ / $\Sigma f . x^2 = 950$ / $\Sigma f = n = 10$

~~$s^2 = \frac{242}{2} - \frac{(24)^2}{6} = 25$~~

$s^2 = \frac{\Sigma f . x^2}{n-1} - \frac{(\Sigma f . x)^2}{n(n-1)} = \frac{950}{9} - \frac{(90)^2}{90}$

$s^2 = \frac{140}{9} = 15.56$

Q7) When the standard deviation is negative, then:

A) most scores were above the mean.

B) " " " below " " .

c) The distribution is badly skewed.

D) Someone made a mistake.

E) none of these because the standard deviation can never be negative.

Q8) The mean of a sample data of size 100 is 45 and the variance is 200. When an observation is deleted, $\sum x^2$ of this sample becomes 220700, Then this observation is A) 44 B) 40 C) 42 D) 36

$\boxed{n = 100}$ $\boxed{\bar{x} = 45}$ $\boxed{s^2 = 200}$ $\sum x = 4500$

New $\boxed{n = 99}$ New $\sum x^2 = 220700$

لإيجاد $\sum x^2$ قبل $\Rightarrow$ $s^2 = \frac{\sum x^2}{n-1} - \frac{(\sum x)^2}{n(n-1)} \Rightarrow 200 = \frac{\sum x^2}{99} - \frac{(4500)^2}{9900}$

old قبل $\sum x^2 = 222300$

New $\sum x^2 = 220700$ $\rightarrow$ Defference = $\boxed{1600}$

$x^2 = 1600 \Rightarrow \boxed{x = 40}$

Q9) If the standard deviation of a data set is zero, then all entries in the data must equal zero. ??!

A) False; the standard deviation can never be zero because it measures the distance from the mean and distances are always greater than zero. ✗ it can be zero

B) False; since the standard deviation is equal to the mean, all the data values must be zero

C) False; if the standard s is zero, then all of the data values ~~must be zero~~. are equal. ✓

* this means there is no defference between x and $\bar{x}$

Q10) The following table gives the number of registered mobile lines for a randomly selected sample of 9 students, the variance of this sample is:

$\hookrightarrow \sum f = n = 9$

					sum
Number of mobile lines	1	2	3	5	
Number of students	2	2	2	3	9
$f \cdot x$	2	4	6	15	27
x^2	1	4	9	25	
$f \cdot x^2$	2	8	18	75	103

$$s^2 = \frac{\sum f \cdot x^2}{n-1} - \frac{(\sum f \cdot x)^2}{n(n-1)} = \frac{103}{8} - \frac{(27)^2}{72} = 2.75$$

Q11) A sample data of 10 numbers has mean 12 and variance $s^2 = 16$ If one number in this sample was changed from 8 to 10, then the new standard deviation is:

$\boxed{n = 10}$ / $\boxed{\bar{x} = 12}$ / $\boxed{s^2 = 16}$

الجديد $\sum x = \sum x_{old} + 2$ // $\sum x^2 = \sum x^2 - 8^2 + 10^2$

old $\sum x = n \cdot \bar{x} = \boxed{120}$ $\rightarrow$ New $\sum x = 120 + 2 = \boxed{122}$

old $\sum x^2 \rightarrow$ $s^2 = \frac{\sum x^2}{n-1} - \frac{(\sum x)^2}{n(n-1)} \Rightarrow 16 = \frac{\sum x^2}{9} - \frac{(120)^2}{90}$

$\rightarrow$ old $\sum x^2 = 1584$

New $\sum x^2 = 1584 - 8^2 + 10^2 = \boxed{1620}$

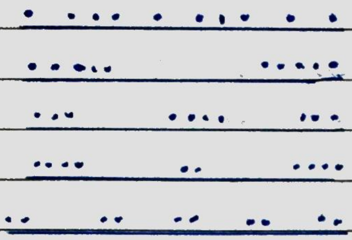
New $s^2 = \frac{1620}{9} - \frac{(122)^2}{90} = \boxed{14.62}$ Variance

standard deviation $s = \sqrt{s^2} = \sqrt{14.62} = 3.823 \approx \boxed{3.82}$

COLLEGE

Q12) Of the following Dot plots, which represents the set of data that has the greatest standard deviation?

A)
B)
C)
D)
E)



Q13) Suppose x in the table beside is the number of emails that eight persons received per hour, then the variance of x is:

x	2	3	4	sum
f	2	4	2	8
f.x	4	12	8	24
x^2	4	9	16	
$f.x^2$	8	36	32	76

$\boxed{n = \Sigma f = 8}$

$s^2 = \frac{\Sigma f x^2}{n-1} - \frac{(\Sigma f x)^2}{n(n-1)}$

$s^2 = \frac{76}{7} - \frac{(24)^2}{8(7)}$

$s^2 = \frac{4}{7} = 0.571$

Sheet (5)

$Q_3 - Q_1 = 30$

Q1 let $y = 2 - 3x$ if the IQR of y is 30 and Q_1 of x is 20, then Q_3 of x equals.

بدل Q_3 of X $\rightarrow$ Q_1 of Y = $2 - 3\, Q_3$ of x

Q_3 of y $\Rightarrow$ $2 - 3\, Q_1$ of x $= 2 - 3(20) = -58$

IQR of y: Q_3 of y - Q_1 of y $= -58 - Q_1$ of y $= 30$

Q_1 of y $= -88$

$-88 = 2 - 3\, Q_3$ of x $\rightarrow$ Q_3 of x $= 30$

طريقة أخرى أسرع.

(IQR) of Y $= |-3|$ (IQR of x) $\rightarrow$ $30 = 3$ (IQR of x)

(IQR of x) $= 10 \rightarrow$ $10 = Q_3$ of x $- Q_1$ of x

$\rightarrow 10 = Q_3$ of x $- 20$ $\rightarrow$ Q_3 of X $= 30$

Q2) In a sample, the standard deviation is 4, if the observation (x) is changed to $Y = 4X - 1$, then the new variance is

S of $x = \boxed{4} \Rightarrow S^2$ of $x = \boxed{16}$

S^2 of $y = 4^2 (S^2$ of $x) = 16 * 16 = 256$

Q3) In a sample, the 1st quartile is 12, the median is 35 and the 3rd quartile is 42, if each observation x is changed to $Y = -2X - 1$, then the new 3rd quartile will be:

$\boxed{Q_1 = 12}$, $\boxed{Q_2 = 35}$, $\boxed{Q_3 = 42}$

Q_3 of $y = 2 (Q_1$ of $x) - 1 = -2(12) - 1 = -24 - 1 = -25$

Q4) The variance of the monthly salaries in a company is 400 dinars. If the salary of each employee in this company has been multiplied by 1.2, then the new variance =

S^2 of $x = \boxed{400} \Rightarrow$ New S^2 of $y = (1.2)^2 * 400 = 576$

Q5) The variance of the yearly salaries of teachers in a private school is 250000. At the end of year, the school management decides to تكافئ award each teacher a قدرها bouns of 100 dinars and 10% of the yearly salary. The standard deviation of the teacher yearly after this bonus becomes:

$\underline{1.1} = 110\% \leftarrow 10\% + \underbrace{100\%}$ اضافة 10% له

$\hookrightarrow 1.1\,x$

$y = 1.1X + 100$ اضافة 100 دينار اذا

S^2 of $x = 250000$

S^2 of $y = (1.1)^2 (250000) = 275000\,(1.1) = 302500$

S of $y = \sqrt{S^2 \text{ of } y} = \boxed{550}$

COLLEGE

Q6) Suppose the mean of a math score is ~~45~~ 64 with a standard deviation of 10, if each score is increased by 6 and then each result is multipiled by 11, then new mean and standard deviation are:

$\mu = 64$ // $\sigma = 10$

$y = (x+6) * 11 \rightarrow 11x + 66$

$\bar{x}$ of y = $11 * \bar{x}$ of $x + 66 = 11 * 64 + 66 = \boxed{770}$

New σ = $|11| * \sigma$ of x = $11 * 10 = \boxed{110}$

$\therefore \mu = 770$ and $\sigma = 110$

Q7) In a sample of the observations are symmetric with first quartile 12 and median 16. If each observation X in this sample is updated to $Y = 6 - 3X$, then the new Q_1 is

$Q_1 = 12$ / $Q_2 = 16$

$Q_2 - Q_1 = Q_3 - Q_2$ (symmetric data)

$16 - 12 = Q_3 - 16 \rightarrow \boxed{Q_3 = 20}$

New Q_1 of y = $6 - 3(Q_3 \text{ of } x) = 6 - 3(20) = -54$

Sheet (6)

Q Which of the following measurement cannot be obtained from the box plot.

A) Mean B) Median c) Maximum

d) first quartile E) Third quartile

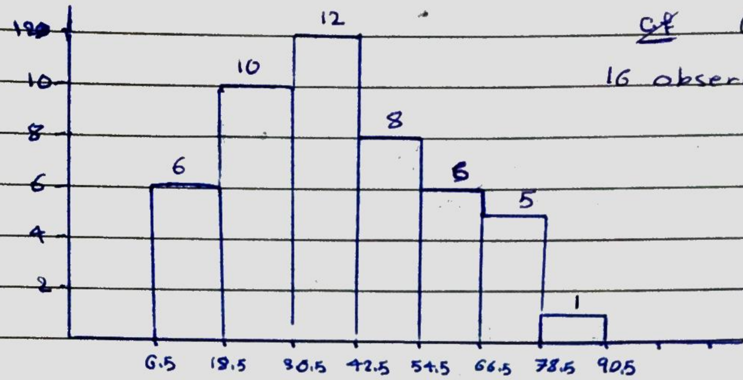
Q2 Given a data set consisting of 32 ← n whole number observations, it is five number summary is (12, 24, $\boxed{39}$, 54, 64), (min, Q_1, Q_2, Q_3, max) how many observations are less than or equal to 24?

$(Q_1 = 24) \rightarrow$ 25% of data less than or equal to 24

$\frac{25}{100} * 32 = \boxed{8}$

COLLEGE

Q4) Consider the following histograms graph, How many observation are less than 30.5 ?



$6 + 10 = \underline{16}$

16 observation.

Q5 A set of data has the following five number summary

min	Q_1	Q_2	Q_3	max
17	37	40	49	90

Which of the following contains all the outliers in the distribution? ...

$IQR = Q_3 - Q_1 = 49 - 37 = 12$

$(Q_1 - 1.5 IQR , Q_3 + 1.5 IQR) : (37 - 1.5(12) , 49 + 1.5(12))$

$(19 , 67) \rightarrow 17 \leq x < 19$ or $67 < x \leq 90$ outliers

A) 83, 85, 90, ~~95~~ ليس من data

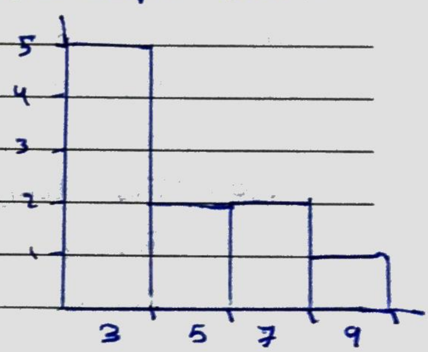
(B) 17, 81, 80, 85, 90 ✓

C) ~~64~~, 80, 85 ✗
outlier ليس

D) 2, 3, 85, 90 ✗
ليس من data

Q7) The following is the histogram of a grouped sample data. The mean equals:

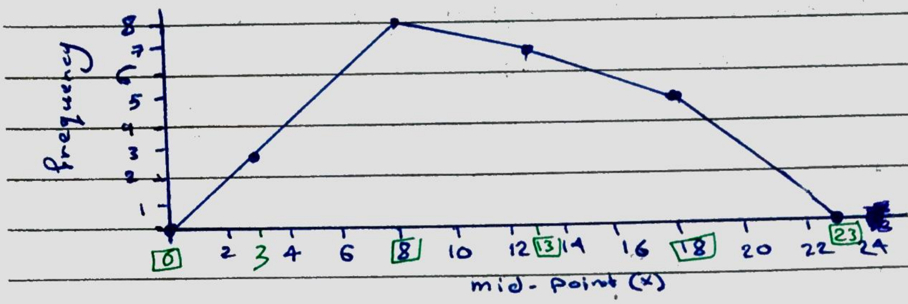
x :	3	5	7	9	sum
f :	5	2	2	1	10
$\sum fx$:	15	10	14	9	48



Sol: $\bar{x} = \dfrac{\sum fx}{\sum f} = \dfrac{48}{10} = 4.8$

COLLEGE

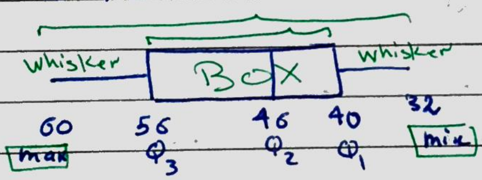
Q8: For the following polygon, find the mean?



x :	3,	8,	13,	18	sum
f :	3	8	7	5	23
fx	9	64	91	90	254

$$\bar{x} = \frac{\sum f.x}{\sum f} = \frac{254}{23} = \boxed{11.04}$$

Q9: The times that statistics students needed to finish an exams are shown in the box plot below.



Find the following: (1) IQR $= Q_3 - Q_1 =$ 56 − 40 = 16

2) outliers

$(40 - 1.5(16) , 56 + 1.5(16))$

$(16 , 80)$

Less than 16 [NO outliers] because the min = 32

more than 80 " " " " max is 60

Q10: The length of the box in a box plot represent;

a) Range B) IQR c) Variance D) Q_3

length the box : $Q_3 - Q_1$ = IQR

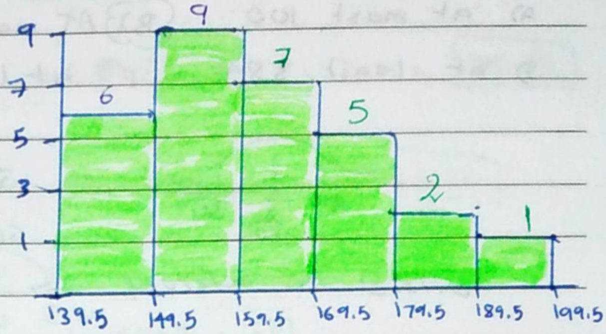
Q11) The histogram below shows the heights of 30 people, the percentage of people with heights greater than or equal 159.5 cm is:

15 people

percentage $\frac{15}{\sum f} * 100\%$

$= r.f * 100\%$

$= \frac{15}{30} * 100\% = 50\%$



Q12) Given the five number summary, determine if there are any outliers in the data. set. Min = 3 / $Q_1 = 6$ / $Q_2 = 9$ / $Q_3 = 12$ / max = 20

A) It's not possible to determine if there are any outliers based on the information given

B) There is not outliers

C) There are at least one on the low end and one on the high end

D) There are at least one on the low end or at least one on the high end.

E) There are at least on the low end and no outliers on the high end

$IQR = Q_3 - Q_1 = 12 - 6 = \boxed{6}$

$(6 - 1.5(6), 12 + 1.5(6)) \rightarrow (-3, 21)$

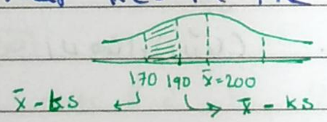
ولأن max = 20 لا يوجد حد أكبر من 20 ، ولأن min = 3 لا يوجد أقل من -3 .

إذن لا يوجد outliers no outliers → B

Sheet (7)

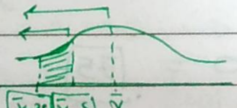
Q1 If the frequency curve of a set data has a bell shape with mean 200 and variance 100, then the percentage of observations that lies in the interval (170, 190) approximately equals to:

$s^2 = 100 \rightarrow s = 10$



$\rightarrow 200 - K(10) = 190 \rightarrow \boxed{k = 1}$

$200 - t(10) = 170 \rightarrow \boxed{t = 3}$



$0.4985 - 0.43 = 0.069$

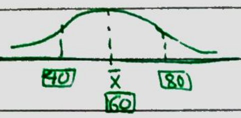
≈ 0.07

$\approx \boxed{7\%}$

Q2: In a sample of 400 observations, the mean is 60 and the variance is 16 $\boxed{s=4}$. The number of observations outside the interval (40, 80) are:

A) at most 100 B) AT most 16 C) at most 25

D) at least 384 E) at least 356



$\bar{x} + k(4) = 80$ or $\bar{x} - 4k = 40$

$60 + 4k = 80 \Rightarrow \boxed{k = 5}$

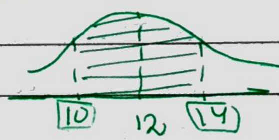
outside the interval $\Rightarrow \frac{1}{k^2} = \frac{1}{25} = 0.04 = 4\%$ percentage

4% of observations $\Rightarrow$ The no. of observation

$= \frac{4}{100} * 400 = 16$ $\Rightarrow$ at most 16 observation...

Q3: The mean & standard deviation of a sample of size 100 are 12 and 1. the ~~most~~ smallest possible $1-\frac{1}{k^2}$ number of observations that are between 10 and 14 is:

$\boxed{n = 100}$ mean $\bar{x} = 12$, $s = 1$



$\bar{x} + ks = 14$ and $\bar{x} - ts = 10$

$12 + 1k = 14$ $12 - t = 10$

$\boxed{k = 2}$ $\boxed{t = 2}$

~~2 standard deviation $\Rightarrow$ The percentage between~~

~~$(\bar{x} - 2s, \bar{x} + 2s) = 95\%$~~

~~The no. of observation $\Rightarrow \frac{95}{100} * 100 = \boxed{95}$~~

the smallest... لأنه طلب الاحتمال (الأقل)

$1 - \frac{1}{k^2} = 1 - \left(\frac{1}{4}\right)$

$\left(1 - \frac{1}{4}\right) * 100 = \frac{3}{4} * 100 = \boxed{75}$

COLLEGE

Q4: A sample of size 200 observations has mean 40 and $\delta = 9$. An interval that contains at least 150 obse... is:

$\boxed{n = 200}$ $\boxed{\bar{x} = 40}$ $\boxed{\delta = 9}$

يعني ال at least $\frac{150}{200} = 0.75 * 100\% = \boxed{75\%}$

$\left(1 - \frac{1}{k^2}\right) = 75\% \rightarrow \frac{1}{k^2} = \frac{1}{4} \rightarrow \boxed{k = 2}$

$\bar{x} - ks$ 40 $\bar{x} + ks$

$\boxed{22} = 40 - 18$ $40 + 18 = \boxed{58}$

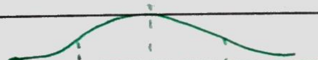
$= (22, 58)$

Q5: A sample data has mean = 30 and std = 14. An interval that contains at least 51% of the data in this sample:

$\boxed{\bar{x} = 30}$ $\boxed{std = 14}$

$\left(1 - \frac{1}{k^2}\right) = 51\% \rightarrow \frac{1}{k^2} = \frac{49}{100}$

$0.49\,k^2 = 1 \rightarrow k^2 = 2.04 \rightarrow \boxed{k = 1.43}$



$30 - 1.43(14)$ 30 $30 + 1.43(14)$

$\boxed{9.98}$ $\boxed{50.02}$ (10, 50)

≈ 10 ≈ 50

Q6: In a sample of 500 observation, the percentage of observations above which 400 observations is

A) P_{20} B) P_{30} C) P_{40} D) P_{15} E) P_{35}

$\boxed{n = 500}$

we can ~~calc~~ find the Percentage below 400

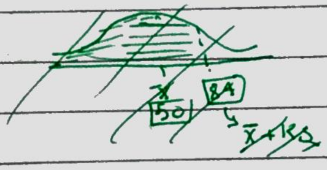
$\left(\frac{kn}{100}\right)^{th} = 400 \rightarrow \left(\frac{k\,500}{100}\right)^{th} = 400 \rightarrow \underline{k = 80}$

$P_{100-80} = \boxed{P_{20}} \rightarrow$ above 400

Q7) The grade of 1000 students are bell shaped with mean = 50 and $S = 13$. Then What is P_{84}:

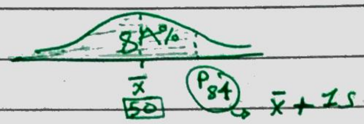
P_{84}; ~~$\left(\frac{84 * 1000}{100}\right)^{th}$~~ ~~$(840)^{th}$~~

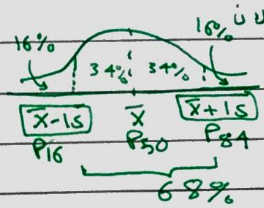
~~$50 + 13K = 84$~~
~~$-50 \quad -50$~~



$K = \frac{34}{13} = 2.61$

$\boxed{P_{84}} = 50 + 13$
$= \boxed{63}$





Q8: The average rain fall in Irbid is 600 m/ms with a standard deviation of 80 m/m over a period of 60 years. Give approximate number of years with rain fall over 680 m/m (Assume a bell-shaped distribution)

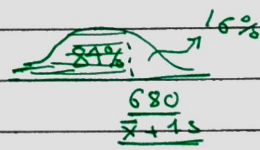
اكثر

$\boxed{\bar{x} = 600}$ $\boxed{S = 80}$ $\boxed{n = 60}$

percentage above 680 يعني   680 in اكثر   كم السنة

$\bar{x} + KS = 680 \rightarrow 600 + 80K = 680 \rightarrow 80K = 80 \rightarrow \boxed{K = 1}$

$\boxed{16\%} \rightarrow \frac{16}{100} * 60 = 9.6 \approx 10$



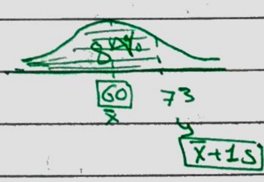
Q9: The distribution of the grades of a Mathematics exam is bell shaped with mean 60 and standard deviation 13. The Percentage of students with grades less than 73 is

$\boxed{S = 13}$

$\bar{x} + KS = 73 \rightarrow 60 + 13K = 73$

$\rightarrow 13K = 13 \rightarrow \boxed{K = 1}$

percentage below 73 is 84%



COLLEGE

Q10) According to the Chebyshev's rule the approximate proportion of observations $\boxed{\text{within}}$ 3.5 standard deviation of the mean is:

outside وليس

A) At least 8% B) At least 92%

C) At most 92% D) Exactly 8%

3.5 standard deviation of the mean $\bar{x} \pm 3.5\,s$

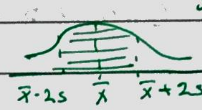
$\rightarrow \boxed{K = 3.5} \Rightarrow 1 - \frac{1}{K^2} = 1 - \frac{1}{(3.5)^2} = 0.918$

$\approx 0.92 \approx 92\% \rightarrow$ At least 92%

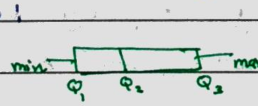
Q11) If a given distribution is known to be symmetric, what percent of the observations are expected to fall within two standard deviations of the mean?

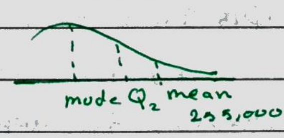
$\bar{x} \mp 2s$

95%



Q12: In 2013, the prices of homes sold in Amman was ~~asked~~ skewed to right with mean 255,000 \$ and standard deviation 105,000 \$. For 2013, the minimum percentage of homes sold in Amman with selling prices between 45,000\$ and 462,000\$ is:





$1 - \frac{1}{K^2}$

لإيجاد K $\bar{x} + Ks = 462000$ or $\bar{x} - Ks = 45000$

$255000 + 105000\,K = 462000 \rightarrow \boxed{K = 1.97}$

$1 - \frac{1}{(1.97)^2} = 0.74 \approx 74\%$

بينما لو أخذنا $\bar{x} - Ks = 45000 \Rightarrow 255000 - 105000K = 45000$

$\rightarrow \boxed{K = 2} \Rightarrow 1 - \frac{1}{4} = 0.75 = 75\%$

Q13) The mean of the sample data of 180 observation is 40 and the standard deviation is 5. An interval that contains at least 160 of these observations is:

$\boxed{n = 180}$ $\boxed{\bar{x} = 40}$ $\boxed{s = 5}$

العدد 160 ⇒ Percentage $\frac{160}{180} = 0.89$

$1 - \frac{1}{k^2} = 0.89 \rightarrow \frac{1}{k^2} = 0.11 \rightarrow k^2 = 9$

$\boxed{k = 3}$

$(\bar{x} - 3s , \bar{x} + 3s) \Rightarrow (40 - 15 , 40 + 15)$

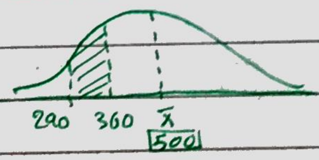
$\therefore (25, 55)$

Q14: For a bell shaped sample data 16% of observation are greater than 42 and 16% of them are less than 30. The mean $\bar{x}$ of this sample equals

$\bar{x} = \frac{30 + 42}{2} = \frac{72}{2} = 36$

Q15: In certain city, the yearly rainfall has mean 500 mm and s = 70 mm over a period of 200 years. Assuming that the distribution is bell-shaped, the approximate number of years with rainfall between 290 mm and 360 mm are: (290, 360)

$\boxed{n = 200 \text{ years}}$ $\boxed{\bar{x} = 500}$ $\boxed{s = 70}$



$360 = \bar{x} - ks \rightarrow 360 = 500 - 70k$

$\rightarrow \boxed{k = 2}$

$290 = \bar{x} - bs \rightarrow 290 = 500 - b(70)$

$\rightarrow \boxed{b = 3}$

النسبة : $49.75 - 47.5\% = 0.0225$

العدد : $0.0225 \times 200 = 4.5$

≈ 5