QM 250
Mid-term Exam
Revision

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Example sheet

1. **The ages , in years , of sample of 7 employees , chosen at random from UOB staff are as follow :**

44	**38**	**25**	**32**	**27**	**40**	**25**

A) **Fined the**
- Mean, median, mode
- Range, standard deviation, variance
- 70^{th} percentile and interpret its meaning
- Coefficient of skewness . is the distribution of the data symmetric

b) **Consider the above values a population . fined the mean , standard deviation ,variance of this population .**

2. **The following are the number of minutes to commute from home to college for a sample of 10 students :**

30	**25**	**19**	**40**	**20**	**32**	**35**	**28**	**36**	**26**

A) Group the above data into classes using a frequency distribution table .
B) Fined the mean , and the standard deviation
C) Draw a histogram

1. **You are given the following sample information . fined the mean and the standard deviation .**

Class limits:	18 up to < 24	24 up to < 30	30 up to < 36
No. of item:	8	5	2

CH 1 : Introduction to Statistics

Definition of statistics:

A science that is concerned with the collection , or organization , Analysis , and interpretation ofdata to make better decision

Function of statistics:

1- Collection
2- Organization
3- Analysis
4- Interpretation

Data can be collected from

different sources

depending on the:

Type of data and the purpose of the data . or which the data are collected .
Data can be collected either from a population or from a sample

Population : The number of all items or objects which are of interest to our study

Sample : small part of population

The reasons why we study a sample and not a population:

1. The study of population will need a large amount of resources , time , effort , money
2. The population is too big to study , and even too different to fined
3. The study of population could destroy population

Not any sample is a good sample , because you need a sample that represent a population

In order for the sample to be random , every item or number of the population should have anequal chance of being chosen in the sample

Whether data are collected from the population or from the sample , they are aboutsomething called a variable

Types of variable:

1. **Qualitative (non-numeric)**
   Examples : Gender , colors , professions (job) , name of places
2. **Quantitative (numeric)**
   A) Discrete variable:
   Example: number of family
   B) Continues variable:
   Example: weigh, clock, size, temperature

most of the variable in our life are continuous

CH 2 , 3 , 4

Organization of data:

After data are collected , they need to be organized in a useful , meaningful form , in chapter (2 + 3 + 4) we will study different ways of organizing data , data can be : ungrouped data , grouped data.

1. Organizing un-grouped sample data:

In this case we summaries the data in different ways without grouping them into certaingroups.

The mean : is the sum (total) of all data values divided by their number.

Equation : $\overline{x} = \frac{\sum x}{n}$

$\bar{x}$: mean of x value
X : each value in the data
n : the number of data values (sample size)
$\sum$: *the sum of values* called (sigma)

Example (1) : from the examples sheet :

$$\bar{x} = \frac{\sum(44+38+25+32+27+40+25)}{7}$$

$$\bar{x} = \frac{231}{7} = 33 \text{ years}$$

The features of the mean :

1. For every set of data there is only (one) mean
2. All data values are used in the calculation of the mean (every item is used)
3. The mean is also known as the average , arithmetic mean , and the expected value .
4. The mean is influenced (affected) by extreme values , we mean the value that is either too big or too small compared to our data .

therefore , if we have an extreme value in the data , it is better to not use themean .

5. The sum of the deviation between the data values and their mean is always (zero).

Example for point 5

x	x-$\bar{x}$
10	10-9 = 1
12	12-9 = 3
8	8-9 = -1
6	6-9 = -3
$\sum x = 36$	$\sum(x-\bar{x}) = 0$ $\sum(1+3-1-3) = 0$
$\bar{x}$ = 9	

The median :

is the middle (or the central) value of an ordered set of data . by ordered set of data , we mean the data values have to be rearranged starting from the smallest and ending with the largest

Example (1) : from the examples sheet

First we rearranged the values from the smallest to biggest

25 – 25 – 27 – 32 – 38 – 40 – 44

The median is 32 years

if we have even numbers of value we take the 2 central values and divided them by 2

Example :

90 – 100 – 110 – 120 – 125 – 13

$$\frac{110 + 120}{2} = 115$$

The median is 115

we can find the median using the location equation :-Location of the median

= 0.5 (n + 1)

= 0.5 (7 + 1) = 4

4 is not the median , it is the location of the median The forth value from the sample data is the media = 32

The features of the median

1. 50% of the data values come before the median , and the other 50 % are after the median.

2. The median is not affected by extreme values in the data.

3. For every set of data there is only (one) median .

The mode : is the value or values that occurs more frequently in the data than other values

Example (a)

The mode is 25 year

The features of the mode:

1. For any set of data , there could be no mode , one mode , or more than one mode

Example:

values								mode	Reason
100	120	170	90					Non	No value repeated
9	7	9	7	9	7			Non	The values are repeated equally
35	37	90	40	37	80			37	
80	89	90	89	90	70	30	90	89 & 90	

2. The mode is not affected by extreme values
3. The mode can be used to describe quantitative as well as qualitative

Example:

black	red	blue	black	green

The mode is black

The Mean , the Median , and Mode are known as : numerical measures of location

Example:

The range : is the difference between the highest data values and the lowest

.Range = H – L

= 44 – 25

= 19 years

The features of the range:

1. The range is affected by extreme value
2. It is a weak measure of variation , because it depends only on 2 values of the data andignore the rest
3. There is only (one) range for the set of data

The standard deviation measures how far the data values are from their mean .

Equation: $s = \sqrt{\frac{\sum(x-\bar{x})^2}{n-1}}$

S : the sample standard deviation

X : every item in the data

$\bar{X}$: the sample mean

N: the sample size

Example :

the standard deviation

To solve any question with the standard deviation equation we use this table :

— —

<table>
<tr><th>x</th><th>$X - \bar{x}$</th><th>$(x - \bar{x})^2$</th></tr>
<tr><td>44</td><td>44 – 33 = 11</td><td>$(11)^2 = 121$</td></tr>
<tr><td>38</td><td>38 – 33 = 5</td><td>$(5)^2 = 25$</td></tr>
<tr><td>25</td><td>25 – 33 = -8</td><td>$(-8)^2 = 64$</td></tr>
<tr><td>32</td><td>32 – 33 = -1</td><td>$(-1)^2 = 1$</td></tr>
<tr><td>27</td><td>27 – 33 = -6</td><td>$(-6)^2 = 36$</td></tr>
<tr><td>40</td><td>40 – 33 = 7</td><td>$(7)^2 = 49$</td></tr>
<tr><td>25</td><td>25 – 33 = -8</td><td>$(-8)^2 = 64$</td></tr>
<tr><td>$\sum x = 231$</td><td rowspan="2">$\sum(x - \bar{x}) = 0$

To be sure that your answer is correct the sum of deviation between the data values and their means is always (zero)</td><td rowspan="2">$\sum(x - \bar{x})^2 = 360$</td></tr>
<tr><td>$\bar{x} = \frac{\sum x}{n} = \frac{231}{7} = 33$</td></tr>
</table>

$S = \sqrt{\frac{360}{7-1}} = 7.75$

The variance : is the standard deviation squared

$S^2 = (7.75)^2 = 60$

S^2 : the sample variance

the standard deviation is the

square root of the variance# the

bigger is the variance

Features of variance & standard deviation:

1. Cannot be (negative) , but it can be (positive) or (Zero)

2. If the standard deviation is (zero) this means there is no difference or deviation between the data values and there means this happens when the data values are allequal and the same

3. The standard deviation is influenced by extreme value4- The smaller standard deviation is the better

*the range , standard deviation , and variance known as :
The numerical measures of variation

#*variation is also known as : deviation , difference , change , spread , dispersion .

The percentiles : are the values that divide an order set of data into

100 equal parts .

*To find a percentiles we have to :

1. Rearrange values from smallest to largest
2. Fined the location of the percentiles
3. The value of the location

Example:

Rearrange values from smallest to largest

1	2	3	4	5	6	7
25	25	27	32	38	40	44

Location of P_{70}= 0.7 (n+1)

= 0.7 (7+1) = 5.6 >>> the location (it means the value of P_{70} is between the 5^{th} and 6^{th} values)

Value of P_{70}

= 1^{st} $value$ + the fraction (2^{nd} value - 1^{st} value)

= 5^{th} value + 0.6 (6^{th}- 5^{th})

= 38 + 0.6 (40 – 38

= P_{70}= 39.2

This means that 70% of the data values are less than 39.2

P_{50}= 0.5 (n+1) the location of P_{50} is the same location of the median .

1) P_{25}: is known as the first quartile (Q_1)
2) P_{50} : is known as the second quartile (Q_2)
3) P_{75} : is known as the third quartile (Q_3)
4) Quartiles are values that divide an ordered set of data into 4 equal parts .
5) 25% of the data values falls below Q_1 , 50% of the data values come before Q_2 , and 75%of the data values come before Q_3 .

Location of Q_1 = 0.25 (n+1)
Location of Q_2 = 0.5 (n+1)
Location of Q_3 = 0.75 (n+1)

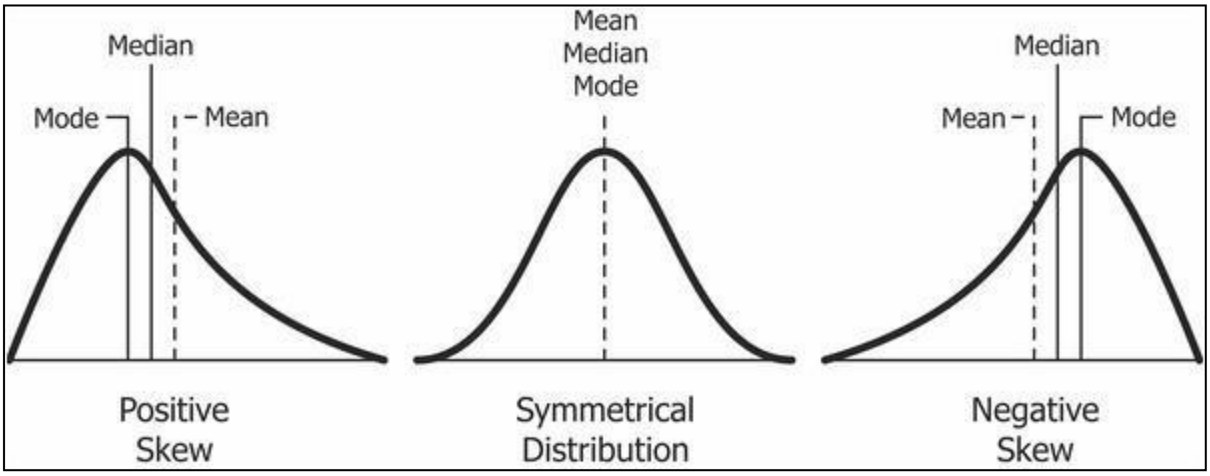
*Percentiles and Quartiles are not influenced

by extreme values# In total we have 3

Quartiles and 99 Percentiles

Coefficient skewness (sk):

There are 3 types of skewness : positive , negative , normal



Mode : the value that have the highest point .

1. In the Positive skewness :
   Mean < Median < Mode

2. In the negative skewness :
   Mode < Median < Mean

3. In the normal (symmetric) skewness :
   Mean = Median = Mode

Example:

$$SK = \frac{3\,(mean - median)}{stander\ deviation}$$

$$= \frac{3\,(33 - 32)}{7.75}$$

= + 0.39 <<< there is a positive skewness in our data

*if the curve has no skewness , sk=0 it means that the curve is symmetric or normal curve

Features of (SK) :

1. Sk ranges between -3 and +3 : $-3 \leq SK \leq +3$
2. If SK negative , this means there is a negative skewness in data and the curve is turningto the left .

Example (1)

The distribution of our data is not symmetric because SK ≠ 0

3. If SK positive , this means there is a positive skewness in data and the curve is turningto the right .
4. Is SK = 0 , this means there is no skewness in the data and the data curve is normal orsymmetric .

The numerical measures :

1. Mean 2. Median 3. Mode

4. range 5. Standard deviation 6. Variance

7. percentile 8. Quartiles 9. Skewness

Example:

The population mean is

$\mu = \frac{\sum x}{N}$

$$= \frac{231}{7} = 33$$

The population standard deviation is $\sigma = \sqrt{\frac{\sum(x-\mu)^2}{N}}$

to fine the population standard deviation we should make this table :

x	X-M	$(X - \mu)^2$
44	44 – 33 = 11	121
38	38 – 33 = 5	25
25	25 – 33 = -8	64
32	32 – 33 = -1	1
27	27 – 33 = -6	36
40	40 – 33 = 7	49
25	25 – 33 = -8	64
$\sum x = 231$	$\sum(x - \mu) = 0$	$\sum(x - \mu)^2 = 360$
$\mu = 33$		

$\sigma = \sqrt{\frac{360}{7}} = 7.17$

The population variance = σ^2

= $(7.17)^2 = 51.43$

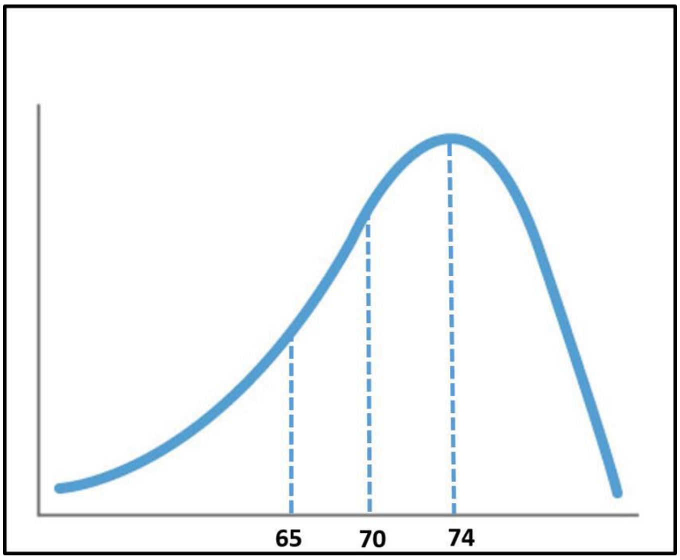
Equation: $\sigma^2 = \frac{\sum((x-\mu))^2}{N}$

*The other numerical measures (median , mode , range , quartile , percentile , SK) are foundthe same way used in sample date .

Exercise :

You are given the following diagram , fined the following

a) P_{50}
b) $sk\ if\ S^2 = 196$
c) Q_2



Solution :

a) $P_{50} =$
70 , *because it is the same as the median* .

b) $SK = \frac{3(mean - median)}{stander\ devition} = \frac{3(65-70)}{\sqrt{196}} = -1.07$

There is a negative skewness on the data

c) Q_2= P_{50}=Median = 70

**The data in this question are sample , because of the* S^2

Exercise 2 :

The following sample : 410 – 300 – 420 – 310 – M – 430 has a Mean of 375 . fined the M , the Median , P_{40} , Q_1

A) Mean = $\frac{\sum x}{n}$

375 =$\frac{\sum x}{6}$ (طرفين في وسطين)

$\sum \bar{x}$ = 375 × 6 = 2250
$2250 = 1870\ (\ sample\ total\ ) + M$
2250-1870 = M
380 = M

b) Median :
Rearrange data :

1	2	3	4	5	6
300	310	380	410	420	430

We will solve it by the location :-
Location = 0.5 (n+1)
= 0.5 (6+1) = 3.5
Median = 3^{rd} value + 0.5 (4^{th} - 3^{rd})
= 380 + 0.5 (410 – 380)
395

c) P_{40} = 0.4 (n+1)
= 0.4 $(6 + 1) = 2.8$ >>> location (between the second and third value)
P_{40} = 310 + 0.8 (380 – 310) = 366

*We must rearrange the data win fined : Median , Percentile , Quartile

d) Q_1 :-

$P_{25=}$ $0.25\ (\ 7\ ) = 1.57$ >>> the location

Q_1 = 300 + 0.75 (310 – 300) = 307.5

2. **Organizing grouped sample data :**

In this case the data values need to be classified or grouped into groups or classes , we dothis using frequency distribution table .

Example (2) :- from the example sheets :

To make a frequency table we follow these steps :

1. **Determine the number of classes (K) by using the following rule :**

2^K < n

try different K :-

2^1 = 2

2^2 = 4

2^3 = 8

2^4 = 16 >>> the best no. of classes for our data is 4

2. **Fined the classes interval (i) or width : using the following rule :**

i ≥$\frac{H-l}{k}$

, H: the highest / maximum value in the data

L : the lowest / minimum value in the data

*H-L = Range

i ≥$\frac{40-19}{4} = 5.25 \approx 6$

* if we have a fraction in the value of i , we should round the value to the following whole number , even if the fraction 0.01

Make a frequency table :

No.	Class limits	tally	f	m	fm	$(m-\bar{x})$	$(m-\bar{x})^2$	$(m-\bar{x})^2 f$
1	19 up to 25	//	2	22	44	-7.8	60.84	**121.68**
2	25 up to 31	// //	4	28	112	-1.8	3.24	**12.96**
3	31 up to 37	// /	3	34	102	4.2	17.64	**52.92**
4	37 up to 43	/	1	40	40	10.2	104.04	**104.04**
total			$\sum f = 10$	-	$\sum fm = 298$			$\sum(m-\bar{x})^2 f = 291.6$

b) X = $\frac{fm}{n}$ = $\frac{298}{10}$ = 29.8, you could write the equation as : $\frac{\sum fm}{\sum f}$

Notes :

1- The lower limit of the 1^{st} class is the same as the lowest data value .

2- Upper limit of class = lower limit + (i) = 19 + 6 = 25

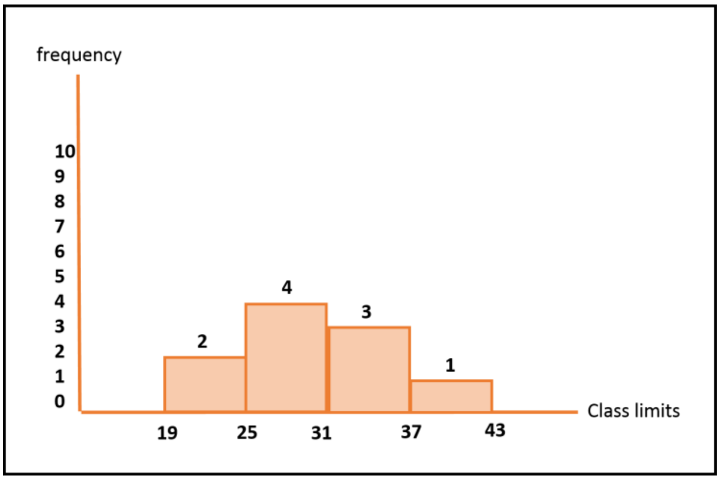
3. The lower limit of the following class is the same as the upper limit of the previous one .
4. (f) means frequency : frequency means the number of data values that related to a class .
5. 5- The sum of (f) is the same of n : $\sum f$=n
6. (m) means class midpoint m , m=$\frac{lower\ limit+upper\ limit}{2}$
7. The mean of grouped sample data , $\bar{x}$ =$\frac{\sum fm}{n}$
8. The standard deviation of grouped sample data is:

$$s = \sqrt{\frac{\sum(m-x)^2}{n-1}} = \sqrt{\frac{291.6}{10-1}} = 5.69$$

9. Variance (S^2) = $(5.69)^2$= 32.4

C) draw a histogram :

A histogram is a bar graph drawn between 2 axes , on the vertical axis we show the frequencies , and on the horizontal axis we show the class limits . the bars of the histogram donot have gaps between them .



From a histogram , we find that the majority of the student commute between 25 to 31minutes . and the majority of them commute between 37 and 43 .

Example (3) :

No. of classes (K) = 3

i=UL – LL = 24 – 18 = 6

classes interval (i) = 6

$\sum f$= n , n= 8+5+2 = 15

Note : m means midpoint = $\frac{LL+UL}{2}$

No.	Class limits	f	m	fm	$(m - \bar{x})$	$(m - \bar{x})^2$	$(m - \bar{x})^2 f$
1	18 up to 24	8	21	168	-3.6	12.96	103.68
2	24 up to 30	5	27	135	2.4	5.76	28.8
3	30 up to 36	2	33	66	8.4	70.56	141.12
total		$\sum f = 15$	-	$\sum fm = 369$			$\sum (m - \bar{x})^2 f = 273.6$

$\bar{x} = \frac{\sum fm}{n} = \frac{369}{15} = 24.6$

The difference between any 2 mid-points = the class interval (i)

S= $\sqrt{\frac{\sum(m-x))^2 f}{n-1}} = \sqrt{\frac{273.6}{15-1}} = \sqrt{19.54}$ =4.42

Notes :

1. The mean of grouped population data is : $\mu = \frac{\sum fm}{n}$
2. The population standard deviation of grouped sample data is :

$$\sqrt{\frac{\sum(N-M))^2 f}{N}}$$

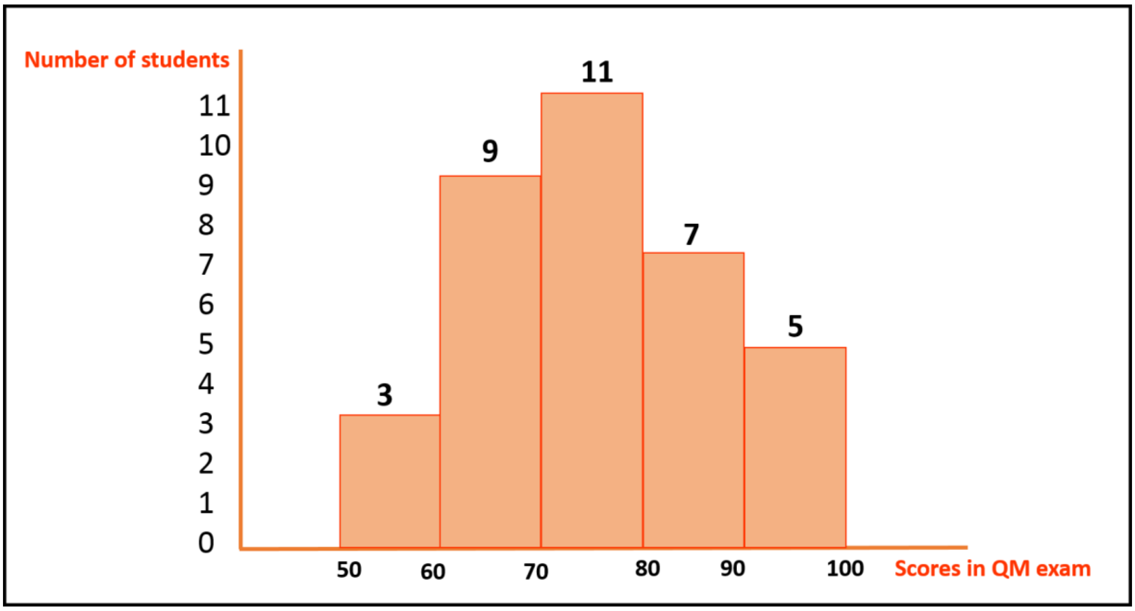
1. Any numerical measures obtained from a sample data is called : Statistic
2. Any numerical measures obtained from a Population data is called : Parameter (note : toremember them easily connect the 2 words with the letter >>> sample = Statistics (S) Population = Parameter (P)
3. The science of statistics can be divided into 2 branches :

Descriptive statistics : this consists of all methods used to summarize , organize ,and present data .

Inferential data : it consists of all the methods used to make decisions about apopulation based on sample data .

Exercise :

You are given the following diagram , answer the questions below :



What is the name of the diagram ?

Histogram

How many students take the test (sample size) ?

$\sum f$ = n = 3 + 9 + 11 + 7 + 5 = 35

How much is the class interval ?

>> i = UL (60) – LL (50) = 10

How many classes of data are used ?

classes , because each par represent a class

What is the class mid-point for the second class ?

>> m=$\frac{ul+ll}{2}$ = $\frac{70+60}{2} = 65$

How many students scored less than 80 ?

11 + 9 + 3 = 23

How many students failed (< 60) ?

3 students

How many students scored A (≥ 90) ?

5 students

The majority (highest par) of students scored between which & which score ?

70 & 80

What is the lowest score in the class ?

50

the lowest limit in the first class = lowest score

	Grade				
gender		A	B	C	
	M	10	5	20	**35**
	F	15	10	30	**55**
	Total	25	15	50	**90**

1-what Thais table a told?

Contingency: show relationship between two variables or more

2-How many variables?

Two (grade, gender)

3- We chose one of probability find probability male or grade C?

P (m or C) =p (m) + p(C)-p (m, c)

$=\frac{35}{90}+\frac{50}{90}-\frac{20}{90}=\frac{65}{90}=\frac{13}{18}$

4-find probability grad A or female?

P (A or F) =p (A) +p (F) - p (A, F)

$=\frac{25}{90}+\frac{55}{90}-\frac{15}{90}=\frac{13}{18}$

5-find probability grade A or grad C?

P (A or C) =P (A) +P(C)-P (A, C)

$=\frac{25}{90}+\frac{50}{90}-\frac{0}{90}=\frac{75}{90}$

M.e (mutely exclusive) if p (A, B) =0

6- are grade A and mate me?

P (A and m) $=\frac{10}{90} \neq 0 \; not \; m.e$

7-are grade B and C me?

P (B, C) =0 yes m.e

8-find probability not getting A?

negative word in >> complement rule

$P(\overline{Z}) = P(Z) = 1 - P(Z)$

$P(\overline{A}) = 1 - P(A) = 1 - \frac{25}{90} = \frac{65}{90}$

9- Find probability not C?

$P(\overline{C}) = 1 - P(C) = 1 - \frac{50}{90} = \frac{40}{90}$

10-find probability female and grad B?

And: multiplication rule

$P(F \text{ and } B) = \frac{10}{90}$

11- Find probability male not grade A?

P (M or A) =1-P (M or A)

=1-(P (M) +p (A)-P (M, A)

=1-(35+25-10/90)=1-(50/90)=40/90

12- Probability female given hear grade A?

Conditional: if, when, that P (A) (B) =P (A, B)/P (B)

P (F/A) =P (F, A)/P (A) =15/25

13-find of male when Grade is B?

P (M/B) =P (M, B)/P (B) =5/15

14-if C what probability female?

start probability for required

P (E/F) = P (F, E)/P (E) =30/50

15- Male independent from C?

P (M, C) =P (M)*P(C) =35/90*50/90=0.22

16- Are female independent from Grade B?

P (F, B) =10/90=0.11 لا يساوي

P (F)*P (B)=55/90*15/90=0.10

Not independent

25- a local bank reports that 80 percent of its customers maintain a checking account 60 percent have a savings account and 50 percent have both if a customer is chosen at random what is the probability the customer has either a checking <u>or</u> a saving account ?

C>0.80 S>0.60 both>C, S>0.50

P(C or S) =P(C) +P(S)-P(C, S)

=0.80+0.60-0.50=0.90

P(C or S) =1-P(C or S) =1-0, 90=0.10

4. **three table listed below show (random variable) and their (probabilities) however only one of these is actually a probability distribution. A. which is it?**

x x	P(X)
5	3
10	3
15	2
20	4
total	12

X	P(X)
5	.1
10	.3
15	.2
20	.4
total	1

X	P(X)
5	.5
10	.3
15	-2
20	.4
total	-0.8

b- Using the correct probability distribution, fin the probability that x is:

(1)Exactly 15 P(x=15) =0.2

(2) No more then 10

يساوي أو من أصغرP(x10)

=P(x=10) +p(x=5) =0.1+0.3=0.4

3) More then 5

P(X>5) =P (10) +P (15) +P (20)

=0.3+0.2+0.4=0.9

(4) At least 12

px

أكبر من أو يساوي

12

=P (15) +P (20) =0.2+0.4=0.6

X	P(X)	X*P(X)	X^2P(X)
5	.1	5(.1)=0.5	**5(.5)=2.5**
10	.3	10(.3)=3	**10(3)=30**
15	.2	15(.2)=3	**15(3)=45**
20	.4	20(.4)=8	**20(8)=160**
Total	1	14.5	**237.5**

5) At most 7.5

px(أصغرمن أو يساوي)

=P (5) =0.1

c- Compute the

mean, variance, and standard deviation of this distribution

Mean=E(x) =14.5

X^2*P(X)- meanمجموعVariance=V(X)=

237.5-14.5^2=27.25

V(X) جذر standard deviation (X) =

=5.22

$= \sqrt{27.25}$=5.22

20-in a binomial distribution n=12 and p=.60 find the following probabilities

A) X=5

P(X=5) =12C5 (0.60) ^5(1-0.60) ^12-5=0.10

b) x≤ 1

P(x=1) +p(x=0)

12C1 (0.60) ^1(1-0.60) ^12-1+12C0 (0.60) ^0(1-0.60) ^12-0=0.0003

c) x≥ 12

P(xاكبر من او يساوي12)

=1-p(x<12)

D) Find mean

Mean =np=12(0.60) =7.2

e) Find variance

Variance=np (1-p) =12(0.60)(1-0.60)=2.88

32-in a Poisson distribution p=4

A) What is the probability that x=2

E^-4(4^2/2!)=0.147

b) what is the probability that x

أصغر من أو يساوي1

P(x=1) +p(x=0)

=e^-4(4^1/1!)+e^-4 (4^0/0!)=0.09

c) What is the probability that x>1

1-p (x أصغر من أو يساوي) 1

=1-0.09=0.911

d) Find mean

=4

e) Find variance

=4

Ms. Bergen is a loan officer at cost bank and trust .from her years of experiences. She estimates that the probability is .025 that an applicant will not be able to repay his or her instalment loan last month she made 40 loans

a) What is the probability that 3 loans will be defaulted?

P(x) =40C3 $(0.025)^3(1-0.025)^{40-3} = 0.06$

b) What is the probability that at least 3 loans will be defaulted?

P (x اكبر من او يساوي)3

1-p(x<3)

P(X$\geq$ $3) = 1 - P(x < 3)$

the probability that a gulf air flight will arrive late is 20% a sample of 8 Gulf Air Flights was selected at random use the binomial distribution to find the

a) Expected number of Flights that arrive late and the standard deviation?

P (arrive late) =0.20

P (not arrive late) =0.80

µ=n*p=8*20%=1.6

b) Expected number of flights that will not arrive late

µ=n*p=8*0.8=6.4

c) Probability that i) at least 2 flights will arrive late

P(x=2 or more)

=1-((P=0) + (P=1))

=1-(8C0 (0.2) ^0(1-0.2) ^8-0) +8C1 (0.2) ^1(1-0.2) ^8-1

=1-(0.168+0.336) =1-0.504=0.496

5 Flights will not arrive late

nCx P^x(1-P) ^n-x

8C5 (0.8) ^5(1-0.8) ^8-5=1.47

6.3 The sales of Lexus cars follows a Poisson distribution with a mean of 3 per day find the

a) Standard deviation of the number of Lexus cars sold per day

$$\sigma = \sqrt{\mu} = \sqrt{3} = 1.732$$

b) Probability that i) at most 2 cars will be sold per day

P (2 or less) =P(x=0) +P(x=1) +P(x=2)

$$\frac{3^0 e^{-3}}{0i} + \frac{3^1 e^{-3}}{1i} + \frac{3^2 e^{-3}}{2i} = 0.0498 + 0.1494 + 0.2240 = 0.4232$$

5 cars will be sold in 2 days

3*2=6

P(x=5)

$$= 0.161 \frac{6^5 e^{-6}}{5i}$$