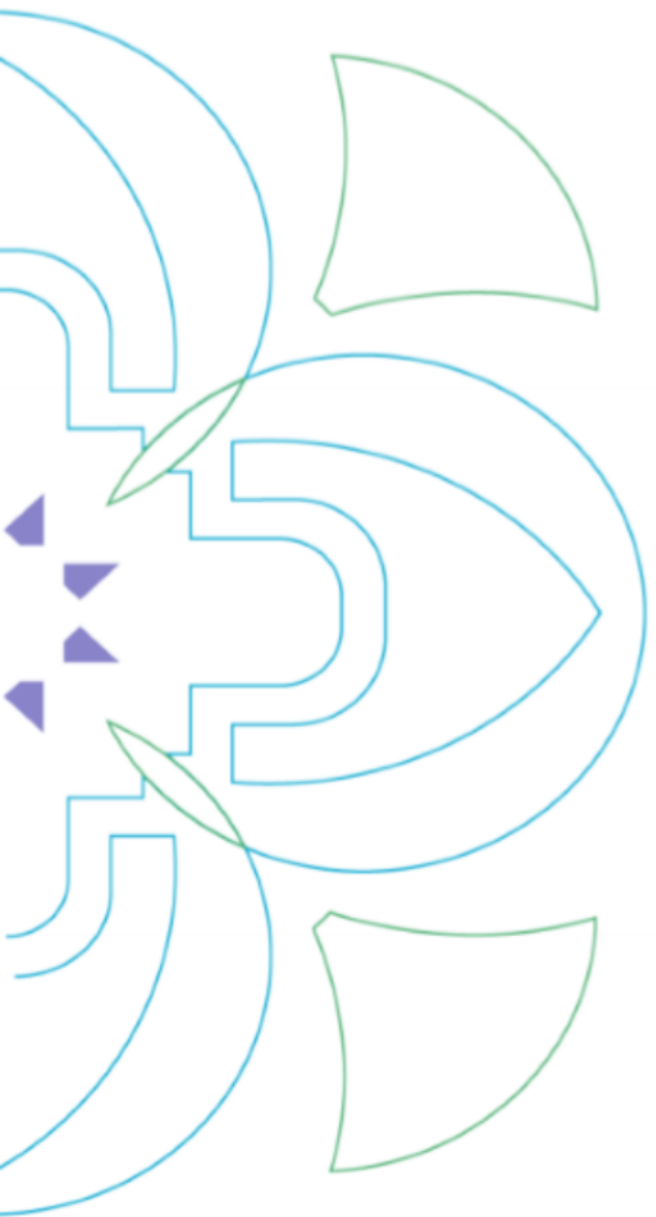




Course Title: General Statistics

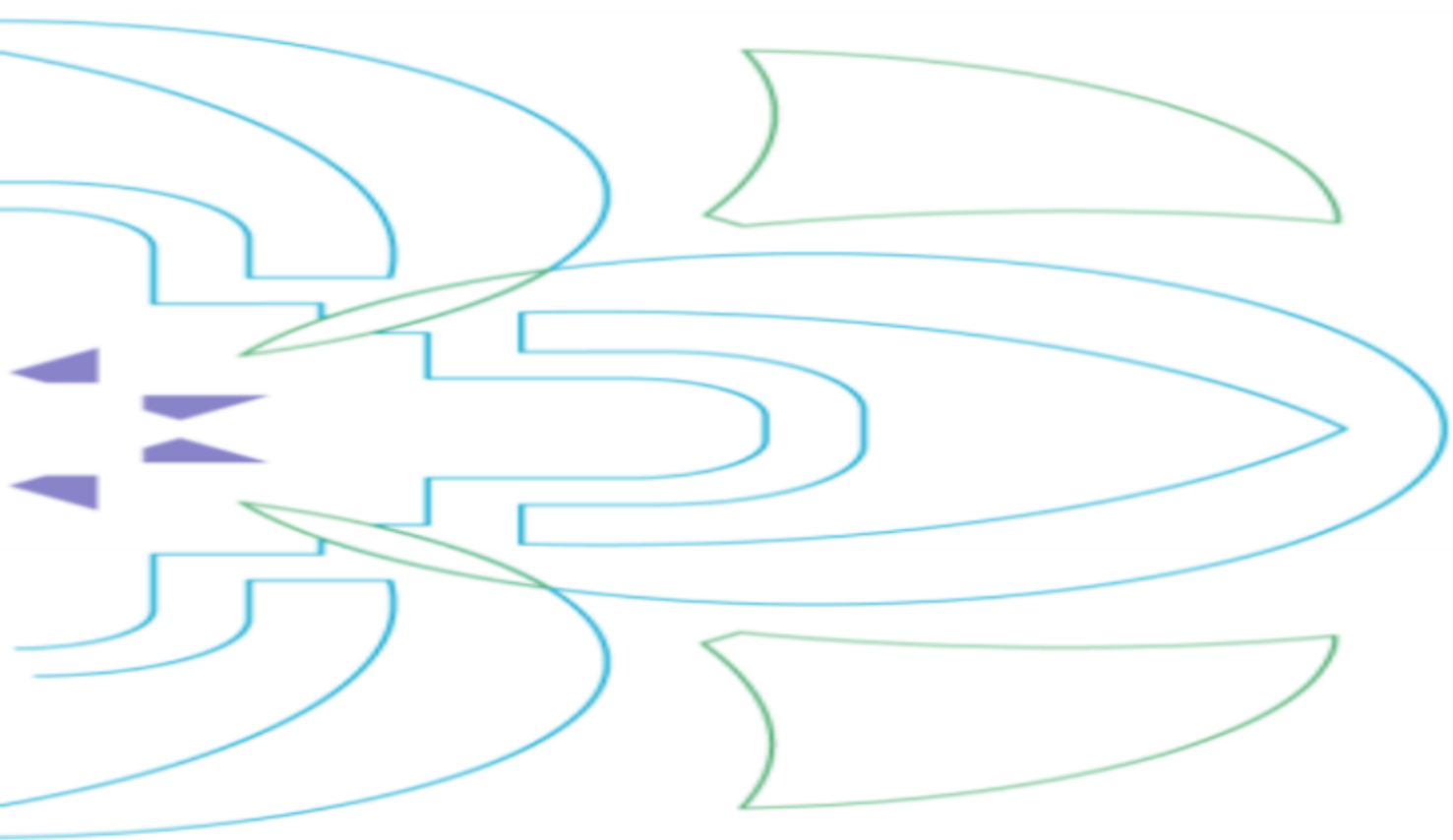
Course Code: Math 161T

Mathematical Sciences Department





اللَّهُمَّ إِنِّي أَسْأَلُكَ عِلْمًا نَافِعًا، وَرِزْقًا طَيِّبًا، وَعَمَلًا مُتَقَبَّلًا



References



1- Larson, R., Farber, B., Elementary Statistics-Picturing the world, 5th Ed.

2- Walpole, R. E., Myers, R. H., and S. L. Myers (2007), Probability and Statistics for Engineers and Scientists, 8th ed., Prentice-Hall, inc., Upper Saddle River, new Jersey.

Course rules



Kindly read carefully the course syllabus first

My Rules

- Listen Carefully
- Do not talk with your friend in class.
- Raise your hand for asking.
- Do not be late for lecture.



الإحصاء في مقدمة

Introduction to Statistics

Lecture 1

WHAT YOU SHOULD LEARN?



- 1) The definition of statistics. ^{تعريف الإحصاء}
- 2) How to distinguish between a population and a sample. ^{كيف تفرق بين المجتمع والعينة}
- 3) How to distinguish between qualitative data and quantitative data. ^{البيانات الكمية}
- 4) How to distinguish between descriptive statistics and inference statistics. ^{الإحصاء الوصفية الإحصاء الاستدلالية}
- 5) How to construct a frequency distribution including limits, midpoints, relative frequencies, Percentage frequency table, cumulative frequency table. ^{التكرار التوزيع التكرار النسبي نقطة المنتصف جدول التكرار النسبي}

Introduction to Statistics



- السبب ظهور الإحصاء
- The reasons for the appearance of Statistics:**
- **Census community.** مجتمع القعداد
 - **Inventory of the wealth of individuals.** الأثراء
الثروة
 - **Data on births, deaths and production and consumption.** المواليد
الوفايات الإنتاج الاستهلاك

Introduction to Statistics



Statistics is defined as the science that deals with the methods of **collecting, organizing, tabulating, and analyzing data** in order to derive meaningful and valid interpretations.

التنظيم

المجموعة

البيانات تحليل

للحصول على نتائج موثوقة

جمع طرق

يتعامل مع

علم

هي

الاحصاء

الإحصاء هو Statistics is ...



جمع

تنظيم

تقديم اعرض

تحليل



- الاستبيانات
- Questionnaire
 - Surveys
 - Interviews
 - Observations
 - Forms
 - Social Media

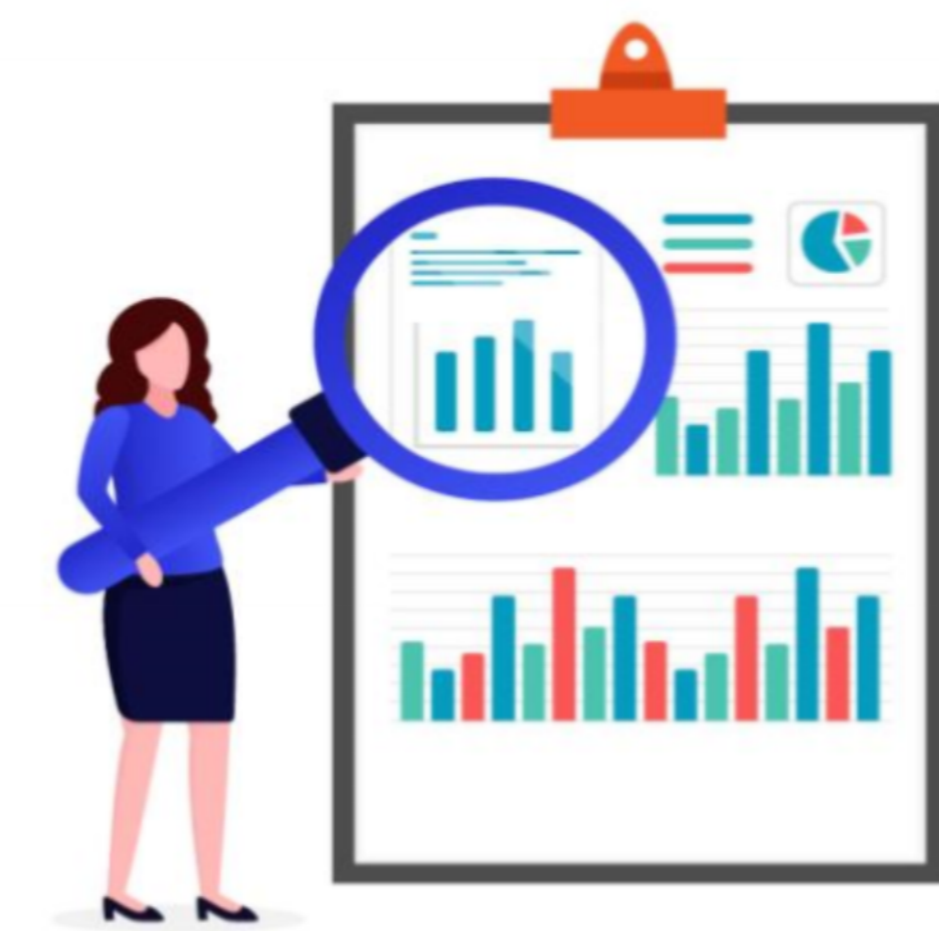
الاجت
القابلية

- تصنيف
- Classification
 - Tabular form
 - Graphical Rep

- Textual
- Tabular
- Graphical

- Mean
- Median
- Mod
- SD
- Variance

- الوجهات ذات نتائج
- Conclusion
 - Recommendations



Data

البيانات



تسجيل

و هي

أجزاء

Any record, descriptive account or symbolic representation of any attributes, event or process expressed in measurable form is considered as 'Data'.

Data consist of information coming from observations, counts, measurement, or responses.
The singular for data is datum.



Data Collection Method:

تتكون من الملاحظات

القائمة من الملاحظات

طرق جمع البيانات

* Census

طريقة إحصائية

Data collected from all the individuals in a population

هي إحصائية التي تخص جميع أفراد المجتمع

* Sampling Method

طريقة إحصائية

Sample is the portion of the population selected to study the characteristics of the whole population

تأثيره حيزها

It should have characteristics similar to population,

نتائج موثوقة

size of the sample should be adequate for reliable results

Definition statistics



Statistics is the science of collecting, organizing, analyzing, and interpreting data in order to make decisions.

البيانات
لدراسة
قرارات

نوعين

There are two types of data sets you will use when studying statistics. These data sets are called populations and samples.

لجتمعات

العينات

Definition of a population (p.g. 3 Larson and Farber)



A **population** In statistics, **population** is the ^{هو} collection of *all outcomes*, *responses*, *measurements*, or counts that are of interest. For example, if we are studying the weight of adult women, the **population** is the set of weights of all the women in the world. القضايا الردود كل النواتج

For example, the population could be **all** the students enrolled at a university, or **all** the homes in a city.

Definition of a sample (p.g. 3 Larson and Farber)



أحد
جزء
من المجتمع
أعلى

A **sample** is a **subset, or part,** of a population. In order to use statistics to learn things about the population

For example, a survey of 1,000 randomly selected students could be used to estimate characteristics of the entire student population

Reasons for drawing a sample, rather than study a population



1. bring the population to a manageable number
2. To reduce cost.
3. To help in minimizing error from the despondence due to large number in the population.
4. Sampling helps the researcher to save time.

توفير الوقت

Definition of a parameter and a statistic (p.g. 4 Larson and Farber)

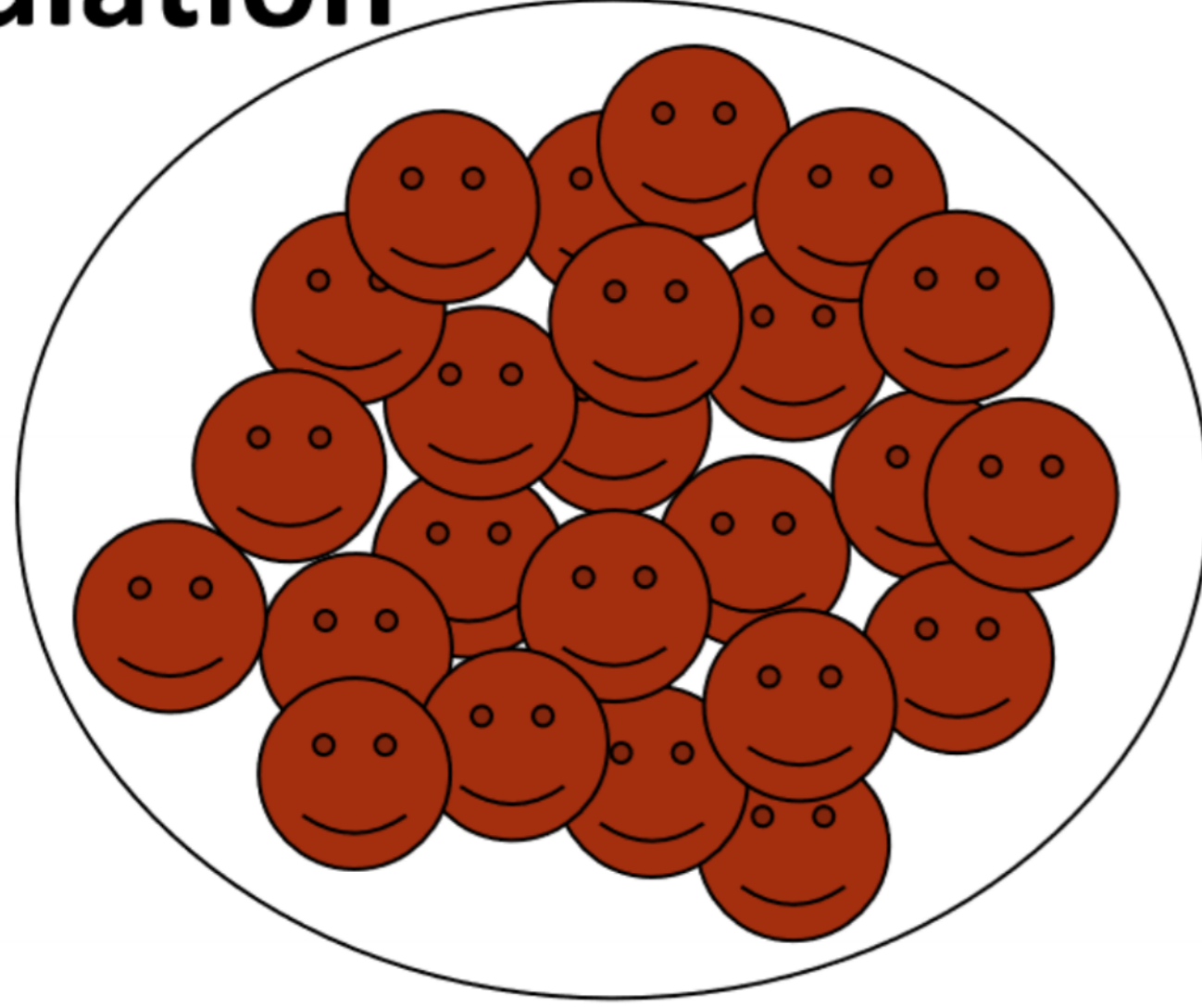


1. A parameter is a numerical description of a population characteristic.
قِيَمَةٌ عَدَدِيَّةٌ لِمُجْمَعٍ
هو
2. A statistic is a numerical description of a sample characteristic.
قِيَمَةٌ عَدَدِيَّةٌ لِمُعَيِّنٍ
خاصةً بالعين

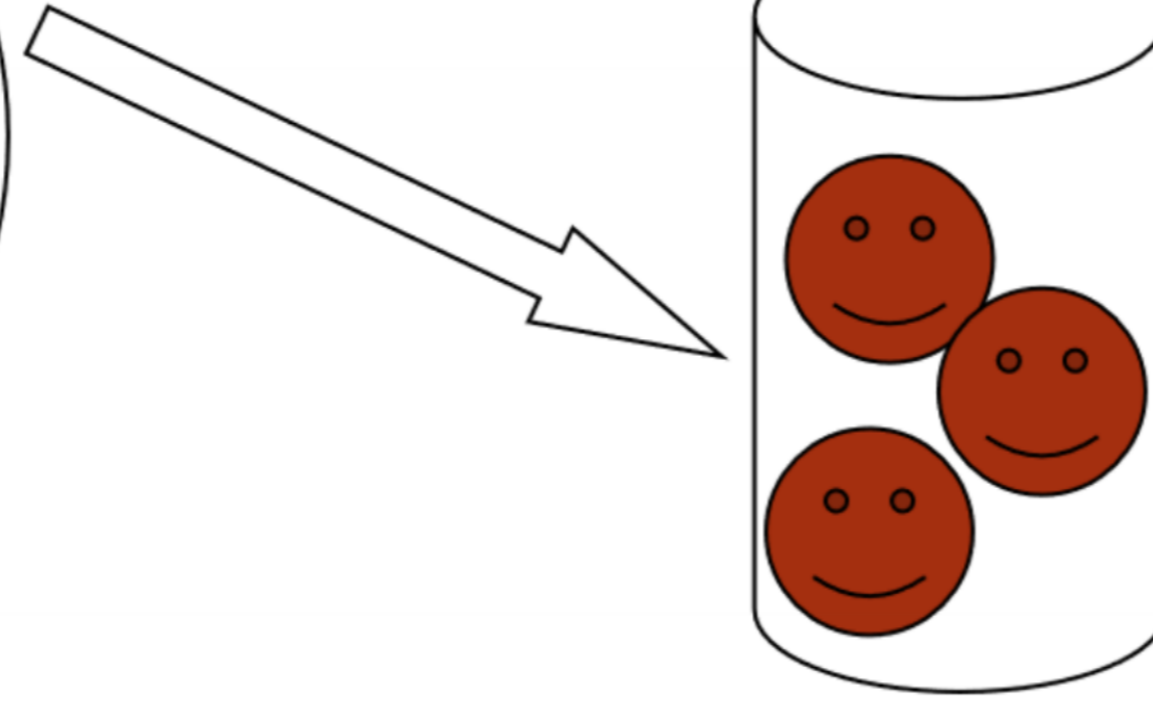
Sample vs. Population



Population



Sample



parameter vs. statistic

Note: It is important to note that a sample statistic can differ from sample to sample whereas a population parameter is constant for a population.

لکون

ثابت

تختلف

سہ کئی باروں

BRANCHES OF STATISTICS

فروع الإحصاء



1. Descriptive Statistics:

وهدفه
تدوين

- Focuses on organizing, summarizing, and presenting data in a meaningful way.
- Includes techniques like calculating measures of central tendency (mean, median, mode) and dispersion (variance, standard deviation).
- Uses graphical representations like histograms, bar charts, and scatter plots to describe data.

تلخيص

البيانات
تقديم

بأمره
مفيدة

2. Inferential Statistics:

استدلال

الاحتمال على نتائج الجميع

- Aims to draw conclusions about populations based on sample data.
- Involves techniques like hypothesis testing, confidence interval estimation, and regression analysis.
- Allows researchers to make inferences and predictions about the broader population.

تدوين

بإتخاذ

السبب

تدوين

المساحة

TYPES OF DATA

(p.g. 9 and 10 Larson and Farber)



Qualitative data ^{وصفية} consist of attributes, labels, or nonnumerical entries.

Quantitative data ^{كمية} consist of numerical measurements or counts.

Subdivided into:

Data at the **nominal** level of measurement are **qualitative only**. Data at this level are categorized using names, labels, or qualities. No mathematical computations can be made at this level.

دستور جمع هذا عن الحرفه

Data at the **ordinal** level of measurement are **qualitative or quantitative**. Data at this level can be arranged in order, or ranked, but differences between data entries are not meaningful.

Data at the **interval** level of measurement can be ordered, and meaningful differences between data entries can be calculated. At the interval level, a zero entry simply represents a position on a scale; the entry is not an inherent zero.

Data at the **ratio** level of measurement are similar to data at the interval level, with the added property that a zero entry is an inherent zero. A ratio of two data values can be formed so that one data value can be meaningfully expressed as a multiple of another.

سؤاله هنا عن الخفض



An inherent zero is a zero that implies “none.” For instance, the amount of money you have in a savings account could be zero dollars. In this case, the zero represents no money; it is an inherent zero. On the other hand, a temperature of does not represent a condition in which no heat is present.

The temperature is simply a position on the Celsius scale; it is not an inherent zero



لَسْتُمْ خَطَوَاتٍ مَعَهُ يَوْمَ الْيَبَاتِ جَمْعٌ لَعْدُ نَعْمُ
We know After collecting the data, there are important steps to organize the information and present it effectively. →
بصورتاً جدیداً
العلماء وقد عرّفوا

Now we will learn what a frequency distribution table is and how to create it using **Excel**

سنتعلم جدول التوزيع التكراري

تعريف

Definition of frequency table (frequency distribution) (p.g. 38 Larson and Farber)



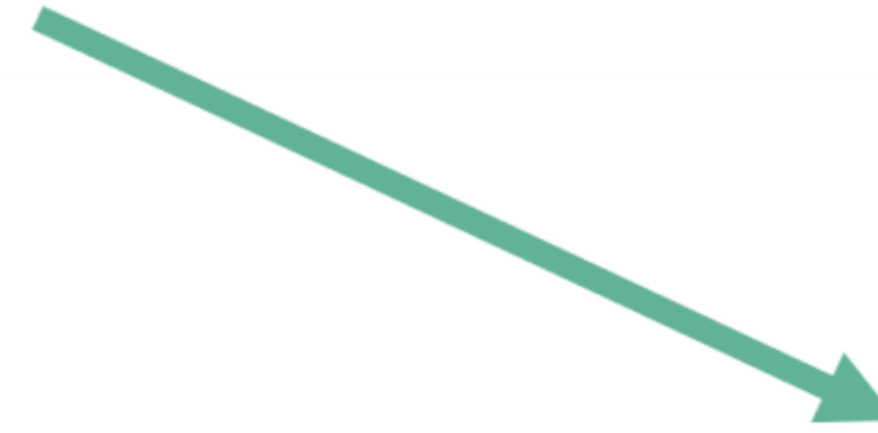
البيانات فترات
يوضح جدول هو التكرار
الموزج

A **frequency distribution** is a table that shows **classes** or **intervals** of data entries with a count of the number of entries in each class.

التكرار
يوضح جدول لهذا
ح عدد كل فئة
This table displays the number of times (frequency) each value or category appears in the data.

The **frequency (f)** of a class is a number of data entries in the class.

67	90	74	71	90	73	74	70	95	51
69	85	84	72	80	50	89	83	72	91
79	78	75	87	76	91	76	87	82	62
70	86	57	73	82	64	88	81	96	71
91	77	66	83	90	74	85	75	81	80



Frequency	Class Intervals
3	50-59
5	60-69
18	70-79
16	80-89
8	90-99
50	Total

Organization Data



عمل
البيانات
تنظيم
سنتظم
كيفية

We will learn how to create:

- Frequency table. جدول التكرار
- Relative frequency table. جدول التكرار النسبي
- Percentage frequency table. النسب المئوية
- Cumulative frequency table. التجميع

Example Frequency Table:



Table 1: Frequency Distribution of Exam Scores

Exam Score Interval	Frequency	Relative Frequency	Percentage Frequency	Cumulative Frequency
59 - 0	12	0.12	12%	12
69 - 60	25	0.25	25%	37
79 - 70	38	0.38	38%	75
89 - 80	20	0.20	20%	95
100 - 90	5	0.05	5%	100
Total	100	1.00	100%	-



How to create a **frequency distribution table** using **Excel**?





Example 1 p.g. 39 Larson and Farber :

The following sample data set lists the prices (in dollars) of 30 portable global positioning system (GPS) navigators. Construct a frequency distribution that has seven classes.

250	150	250	325	70	350	200	400	130	90
130	300	450	160	200	59	130	150	270	275
150	170	180	95	250	200	400	200	100	220

Frequency distribution for quantitative data



For large samples, we can't use the simple frequency table to represent the data.

We need to divide the data into groups or intervals or classes.

So, we need to determine:

- First step :the number of intervals (**k**).
- Second step :the range (**R**).
- Third step :the Width of the interval (**w**).

The number of intervals (k)

عدد الفترات



A small number of intervals are not good because information will be lost.

A large number of intervals are not helpful to summarize the data.

A commonly followed rule is that $5 \leq k \leq 20$

We select 7 intervals in our example.

في هذا المثال سوف نستخدم 7 فترات

Clipboard Font Alignment Number Styles Cells Editing Sensitivity Add-ins Analyze Data

Font: Arial, 11, Bold, Italic, Underline, Paragraph, Text Color, Background Color

Alignment: Left, Center, Right, Justify, Indent, Decrease Indent, Increase Indent, Wrap Text, Merge Cells, Unmerge Cells

Number: General, Currency (\$), Percentage (%), Comma, Thousand Separator, Negative numbers in parentheses, Fraction, Decimals, Date, Time, Custom

Styles: Conditional Formatting, Format as Table, Cell Styles

Cells: Insert, Delete, Format

Editing: Undo, Redo, Find, Replace, Select All, Sort, Filter, Clear All, Clear Contents, Clear Formats, Clear Comments, Hide Unrelated Data

Sensitivity: What-If Analysis, Scenario Manager, Solver, Solver Parameters, Solver Load/Save, Solver Options, Solver Load/Save Options, Solver Options - Solver Parameters, Solver Options - Solver Load/Save, Solver Options - Solver Parameters, Solver Options - Solver Load/Save

Add-ins: Add-ins, Add-ins

Analyze Data: Analyze Data

H14 fx

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
3		the prices																
4		250																
5		150																
6		250																
7		325																
8		70																
9		350																
10		200																
11		400																
12		130																
13		90																
14		130																
15		300																
16		450																
17		160																
18		200																
19		59																
20		130																
21		150																
22		270																

Enter the Data:

Input the data in a single column on the Excel worksheet

ادخال البيانات



The range (R)

المدى

الفرق

بين

الأكبر

والأصغر

It is the difference between the maximum and the minimum observation (entries) in the data set.

$R = \text{the maximum entry} - \text{the minimum entry}$

$$R = 450 - 59 = 391$$

The Width of the interval (w)

عرض الفتره



Find the class width as follows. Determine the range of the data, divide the range by the number of classes, and round up to the next convenient number.

حسابه عن طريق $\frac{R}{K}$

Class intervals generally should be of the same width.

$$W=391/7 = 55.86 \quad \text{Round up to 56.}$$



Determine the Class Intervals:

- Identify the minimum and maximum values in the data set.
- Decide on **the number of classes (k)** you want to use (**seven classes**).
- Calculate **the class width (W)** by dividing **the range (R)** of the data (max - min) by the number of classes

المدى - اقل قيمة

R = the maximum entry - the minimum entry

$$W = R / K$$

Clipboard Font Alignment Number Styles Cells Editing Sensitivity Add-ins Analyze Data

J16 fx

	A	B	C	D	E	F	G
1							
2							
3		the prices					
4		250					
5		150					
6		250					
7		325	Max		450		
8		70	Min		59		
9		350					
10		200	Range (R)		391		
11		400					
12		130	the class width (w)		55.85714		
13		90	w=56				
14		130					
15		300					
16		450					
17		160					
18		200					

Max =MAX(B4:B33
Min MAX(number1, [number2], ...)

Min =MIN(B4:B33
MIN(number1, [number2], ...)

Range =MAX(B4:B33)-MIN(B4:B33
MIN(number1, [number2], ...)

the class width (w) =(E10)/7

Themes Colors Fonts Effects Margins Orientation Size Print Area Breaks Background Gridlines Headings Group Rotate

The upper limit of the first class is one less than the lower limit of the second class.

=H8-1

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1																
2																
3		the prices														
4		250														
5		150														
6		250														
7		325	Max		450			59	=H8-1							
8		70	Min		59			115	170							
9		350						171	226							
10		200	Range (R)		391			227	282							
11		400						283	338							
12		130	the class width (w)		55.85714			339	394							
13		90	w=56					395	450							
14		130														
15		300														
16		450														

the maximum observation



Create the Frequency Distribution Table



Clipboard Font Alignment Number Styles Cells Editing Sensitivity Add-ins

In a separate column, enter the lower class limits for each class.

18 170

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
2																
3		the prices														
4		250														
5		150														
6		250						Class interval	bin							
7		325		Max	450			59-114	114							
8		70		Min	59			115-170	170							
9		350						171-226	226							
10		200		Range (R)	391			227-282	282							
11		400						283-338	338							
12		130		the class width (w)	55.85714			339-394	394							
13		90		w=56				395-450	450							
14		130						total	total							
15		300														
16		450														
17		160														
18		200														
19		59														

Get & Transform Data | Queries & Connections | Data Types | Sort & Filter | Data Tools | Forecast | Analysis

Get Data | Refresh | Properties | Workbook Links | Stocks (En... | Currencies... | Sort | Filter | Clear | Reapply | Advanced | Text to Columns | What-If Analysis | Forecast Sheet | Outline | **Data Analysis**

19 : X ✓ fx 226

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
2																
3		the prices														
4		250														
5		150														
6		250						Class interval	bin							
7		325	Max					59-114								
8		70	Min					115-170								
9		350						171-226								
10		200	Range (R)					227-282								
11		400						283-338								
12		130	the class width (w)					339-394								
13		90	w=56					395-450								
14		130						total	total							
15		300														
16		450														
17		160														
18		200														
19		59														

Data Analysis

Analysis Tools

- Anova: Two-Factor With Replication
- Anova: Two-Factor Without Replication
- Correlation
- Covariance
- Descriptive Statistics
- Exponential Smoothing
- F-Test Two-Sample for Variances
- Fourier Analysis
- Histogram**
- Moving Average

OK Cancel Help

B3 226

	A	B	C	D	E	F	G	H	I
1									
2									
3		the prices							
4		250							
5		150							
6		250						Class interval	bin
7		325	Max		450			59-114	
8		70	Min		59			115-170	
9		350						171-226	
10		200	Range (R)		391			227-282	
11		400						283-338	
12		130	the class width (w)		55.85714			339-394	
13		90	w=56					395-450	
14		130						total	tot
15		300							
16		450							
17		160							
18		200							

Histogram

Input Range: \$B\$3:\$B\$33

Bin Range:

Labels

Output options

Output Range:

New Worksheet Ply:

New Workbook

Pareto (sorted histogram)

Cumulative Percentage

Chart Output

OK Cancel Help

16 : X ✓ fx 226

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
3		the prices														
4		250														
5		150														
6		250						Class interval	bin							
7		325		Max				59-114		114						
8		70		Min				115-170		170						
9		350						171-226		226						
10		200		Range (R)				227-282		282						
11		400						283-338		338						
12		130		the class width (w)		55.85714		339-394		394						
13		90		w=56				395-450		450						
14		130						total		total						
15		300														
16		450														
17		160														
18		200														
19		59														
20		130														

Histogram

Input Range: ↑

Bin Range: ↑

Labels

Output options

Output Range:

New Worksheet Ply:

New Workbook

Pareto (sorted histogram)

Cumulative Percentage

Chart Output

OK Cancel Help

Get & Transform Data | Queries & Connections | Data Types | Sort & Filter | Data Tools | Forecast | Analysis

K6 : fx 226

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
3		the prices														
4		250														
5		150														
6		250														
7		325														
8		70														
9		350														
10		200														
11		400														
12		130														
13		90														
14		130														
15		300														
16		450														
17		160														
18		200														
19		59														
20		130														

Histogram

Input
 Input Range: \$B\$3:\$B\$33
 Bin Range: \$I\$6:\$I\$13
 Labels

Output options
 Output Range: \$K\$6
 New Worksheet Ply:
 New Workbook
 Pareto (sorted histogram)
 Cumulative Percentage
 Chart Output

OK
Cancel
Help



Select any cell

Get & Transform Data | Queries & Connections | Data Types | Sort & Filter | Data Tools | Forecast | Analysis

O20

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
3		the prices														
4		250														
5		150														
6		250						Class interval	bin							
7		325		Max	450			59-114	114			bin	Frequency			
8		70		Min	59			115-170	170			114	5			
9		350						171-226	226			170	8			
10		200		Range (R)	391			227-282	282			226	6			
11		400						283-338	338			282	5			
12		130		the class width (w)	55.85714			339-394	394			338	2			
13		90		w=56				395-450	450			394	1			
14		130						total	total			450	3			
15		300										More	0			
16		450														
17		160														
18		200														
19		59														
20		130														

bin	Frequency
114	5
170	8
226	6
282	5
338	2
394	1
450	3
More	0

Output

Clipboard Font Alignment Number Styles Cells Editing Sensitivity Add-ins Analyze Data

IF : \times \checkmark fx =SUM(O7:O13)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
3		the prices														
4		250												the frequency table		
5		150														
6		250						Class interval	bin		bin	Frequency		Class interval	Frequency	
7		325		Max	450			59-114	114		114	5		59-114	5	
8		70		Min	59			115-170	170		170	8		115-170	8	
9		350						171-226	226		226	6		171-226	6	
10		200		Range (R)	391			227-282	282		282	5		227-282	5	
11		400						283-338	338		338	2		283-338	2	
12		130		the class width (w)	55.85714			339-394	394		394	1		339-394	1	
13		90		w=56				395-450	450		450	3		395-450	3	
14		130						total	total		More	0		total	=SUM(O7:O13)	
15		300													SUM(number1, [number2], ...)	
16		450														
17		160														
18		200														



Table(2): Frequency Distribution for Prices (in dollars) of GPS Navigators

Class interval	frequency
59-114	5
115-170	8
171-226	6
227-282	5
283-338	2
339-394	1
395-450	3
Total	30

Remember :

- Use frequency tables for categorical data.
- You can also present numerical data as interval.
- Each table should have a number and a title.
- Table Number and Title **above** the table.



Table(2): Frequency Distribution for Prices (in dollars) of GPS Navigators

Class interval	frequency
59-114	5
115-170	8
171-226	6
227-282	5
283-338	2
339-394	1
395-450	3
Total	30

سَتَقِيحُ اِيضًا حَالِي
You can also calculate **the relative frequency, percentage frequency, and cumulative frequency** in additional columns.

عن النكدة اخنا فيه

تعريف حدود الفئات



Definition of the Class boundaries intervals

Class boundaries are the numbers that separate classes without forming gaps between them. If data entries are integers, subtract 0.5 from each lower limit to find the lower class boundaries. To find the upper class boundaries, add 0.5 to each upper limit. The upper boundary of a class will equal the lower boundary of the next higher class.

$$\text{the class lower boundary} = \text{the lower limit} - (0.5)$$

$$\text{the class upper boundary} = \text{the upper limit} + (0.5)$$

Clipboard Font Alignment Number Styles Cells Editing Sensitivity Add-ins Analyze Data

IF : =H7-0.5

the class lower boundary= the lower limit – (0.5)

			lower boundary	upper boundary	Class interval	the class lower boundary	the class upper boundary	class boundary
7	Max	450	59	114	59-114	=H7-0.5	114.5	58.5-114.5
8	Min	59	115	170	115-170	114.5	170.5	114.5-170.5
9			171	226	171-226	170.5	226.5	170.5-226.5
10	Range (R)	391	227	282	227-282	226.5	282.5	226.5-282.5
11			283	338	283-338	282.5	338.5	282.5-338.5
12	the class width (w)	55.857143	339	394	339-394	338.5	394.5	338.5-394.5
13	w=56		395	450	395-450	394.5	450.5	394.5-450.5

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IF : =I7+0.5

the class upper boundary= the upper limit + (0.5)

				lower boundary	upper boundary	Class interval	the class lower boundary	the class upper boundary	class boundary
7	Max	450		59	114	59-114	58.5	=I7+0.5	58.5-114.5
8	Min	59		115	170	115-170	114.5	170.5	114.5-170.5
9				171	226	171-226	170.5	226.5	170.5-226.5
10	Range (R)	391		227	282	227-282	226.5	282.5	226.5-282.5
11				283	338	283-338	282.5	338.5	282.5-338.5
12	the class width (w)	55.857143		339	394	339-394	338.5	394.5	338.5-394.5
13	w=56			395	450	395-450	394.5	450.5	394.5-450.5



Class interval	class boundary	frequency
59-114	58.5-114.5	5
115-170	114.5-170.5	8
171-226	170.5-226.5	6
227-282	226.5-282.5	5
283-338	282.5-338.5	2
339-394	338.5-394.5	1
395-450	394.5-450.5	3
Total		30

Definition of the Mid-interval (Midpoints)



نقطة منتصف
مجموع

The **midpoint of a class** is the sum of the lower and upper limits of the class divided by two.

The Mid-interval (Midpoints) = (the lower limit + the upper limit) / 2

$$\frac{\text{الحد الأدنى} + \text{الحد الأعلى}}{2}$$

Clipboard Font Alignment Number Styles Cells Editing Sensitivity Add-ins Analyze Data

IF : $= (H7+I7)/2$

The Mid-interval (Midpoints)=(the lower limit+ the upper limit)/2

	E	F	G	H	I	J	K	L	M	N	O
3											
4											
5											
6											
7		450		59	114	59-114	58.5	114.5	58.5-114.5	$= (H7+I7)/2$	
8		59		115	170	115-170	114.5	170.5	114.5-170.5	142.5	
9				171	226	171-226	170.5	226.5	170.5-226.5	198.5	
10		391		227	282	227-282	226.5	282.5	226.5-282.5	254.5	
11				283	338	283-338	282.5	338.5	282.5-338.5	310.5	
12)	55.857143		339	394	339-394	338.5	394.5	338.5-394.5	366.5	
13	w=56			395	450	395-450	394.5	450.5	394.5-450.5	422.5	
14											
15											
16											
17											



Class interval	midpoint	frequency
59-114	86.5	5
115-170	142.5	8
171-226	198.5	6
227-282	254.5	5
283-338	310.5	2
339-394	366.5	1
395-450	422.5	3
Total		30



Definition of the relative frequency

النسبة النسبية
هو التكرار النسبي
The relative frequency of a class is the portion or percentage of the data that falls in that class. To find the relative frequency of a class, divide the frequency (f) by the sample size (n).

العدد / التكرار
the relative frequency = the frequency (f) / the sample size (n).

Clipboard Font Alignment Number Styles Cells Editing Sensitivity Add-ins Analyze Data

IF : fx =07/0\$14

	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
2															
3															
4															
5															
6				Class interval	bin		<i>bin</i>	<i>Frequency</i>		Class interval	Frequency	the relative Frequency	the percentage frequency	the cumulative frequency	
7	450			59-114	114		114	5		59-114	5	=07/0\$14	16.67	5	
8	59			115-170	170		170	8		115-170	8	0.2667	26.67	13	
9				171-226	226		226	6		171-226	6	0.2000	20.00	19	
10	391			227-282	282		282	5		227-282	5	0.1667	16.67	24	
11				283-338	338		338	2		283-338	2	0.0667	6.67	26	
12	85714			339-394	394		394	1		339-394	1	0.0333	3.33	27	
13				395-450	450		450	3		395-450	3	0.1000	10.00	30	
14				total	total		More	0		total	30	1	100.00		
15															
16															
17															

Definition of the percentage frequency



the percentage frequency = (the relative frequency) \times 100

or

the percentage frequency = (the frequency (f) / the sample size (n)) \times 100

Clipboard | Font: Times New Roman, 14 | Alignment | Number | Styles: Conditional Formatting, Format as Table, Cell Styles | Cells: Insert, Delete, Format | Editing: Sum, Filter, Sort, Find, Undo, Redo | Sensitivity | Add-ins | Analyze Data

IF : $= (07/0\$14) * 100$

		Class interval	bin	bin	Frequency	Class interval	Frequency	the relative Frequency	the percentage frequency	the cumulative frequency
2										
3										
4										
5										
6		59-114	114	114	5	59-114	5	0.1667	$= (07/0\$14) * 100$	5
7	450	115-170	170	170	8	115-170	8	0.2667	100	13
8	59	171-226	226	226	6	171-226	6	0.2000	20.00	19
9		227-282	282	282	5	227-282	5	0.1667	16.67	24
10	391	283-338	338	338	2	283-338	2	0.0667	6.67	26
11		339-394	394	394	1	339-394	1	0.0333	3.33	27
12	85714	395-450	450	450	3	395-450	3	0.1000	10.00	30
13		total	total	More	0	total	30	1	100.00	
14										
15										
16										
17										



Definition of The cumulative frequency

التكرار
القسم

التكرارات
الجمعي

The **cumulative frequency** of a class is the sum of the frequencies of that class and all previous classes. The cumulative frequency of the last class is equal to the sample size n .

Clipboard | Font: Times New Roman, 12 | Alignment: General | Number: \$, %, .00, .00 | Styles: Conditional Formatting, Format as Table, Cell Styles | Cells: Insert, Delete, Format | Editing: Sum, Filter, Sort, Find, Undo, Redo | Sensitivity: Sensitivity | Add-ins: Add-ins | Analyze Data

IF | fx | =SUM(O\$7:O7)

			Class interval	bin		bin	Frequency	Class interval	Frequency	the relative Frequency	the percentage frequency	the cumulative frequency					
2																	
3																	
4																	
5																	
6																	
7	450		59-114	114		114	5	59-114	5	0.1667	16.67	=SUM(O\$7:O7)					
8	59		115-170	170		170	8	115-170	8	0.2667	26.67	SUM(number1, [number2], ...)					
9			171-226	226		226	6	171-226	6	0.2000	20.00	19					
10	391		227-282	282		282	5	227-282	5	0.1667	16.67	24					
11			283-338	338		338	2	283-338	2	0.0667	6.67	26					
12	85714		339-394	394		394	1	339-394	1	0.0333	3.33	27					
13			395-450	450		450	3	395-450	3	0.1000	10.00	30					
14			total	total		More	0	total	30	1	100.00						
15																	
16																	
17																	

Clipboard Font Alignment Number Styles Cells Editing Sensitivity Add-ins Analyze Data

P16 fx

	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
2															
3															
4															
5															
6				Class interval	bin		<i>bin</i>	<i>Frequency</i>		Class interval	Frequency	the relative Frequency	the percentage frequency	the cumulative frequency	
7	450			59-114	114		114	5		59-114	5	0.1667	16.67	5	
8	59			115-170	170		170	8		115-170	8	0.2667	26.67	13	
9				171-226	226		226	6		171-226	6	0.2000	20.00	19	
10	391			227-282	282		282	5		227-282	5	0.1667	16.67	24	
11				283-338	338		338	2		283-338	2	0.0667	6.67	26	
12	85714			339-394	394		394	1		339-394	1	0.0333	3.33	27	
13				395-450	450		450	3		395-450	3	0.1000	10.00	30	
14				total	total		More	0		total	30	1	100.00		
15															
16															
17															



Table(2): Frequency Distribution for Prices (in dollars) of GPS Navigators

Class interval	Frequency	the relative Frequency	the percentage frequency	the cumulative frequency
114-59	5	0.1667	16.67%	5
170-115	8	0.2667	26.67%	13
226-171	6	0.2000	20.00%	19
282-227	5	0.1667	16.67%	24
338-283	2	0.0667	6.67%	26
394-339	1	0.0333	3.33%	27
450-395	3	0.1000	10.00%	30
total	30	1	100.00%	

Homework

From (Larson and Farber)



Use the Excel program and manual calculations to solve the numerical exercises:

➤ Ex1.1, P 6: 1,2,3,4,5,6, 8 , 9, 10,11, 12, 13, 14,15, 19;

➤ Ex1.2, P 13: 7, 8, 9, 10,14, 15, 18;

➤ Ex 2.1, P 47: 11, 12, 14, 31, 32,33

