

### Introduction to the Minitab Program

**Minitab** is a widely used statistical software designed to simplify the process of data analysis. It provides a user-friendly interface and a comprehensive set of tools that support researchers, students, and professionals in various fields. Minitab is especially popular in **quality improvement projects, academic research, and data-driven decision-making.**

Key features of Minitab include:

1. **Data entry and management** through spreadsheet-like tables.
2. **Statistical analysis** such as hypothesis testing, Analysis of Variance (ANOVA), and regression.
3. **Graphical representation** of results with charts, histograms, and control charts.
4. **Integration with Six Sigma methodologies** and quality tools.

Compared with other statistical packages such as SPSS or SAS, Minitab is known for its **simplicity and accessibility**, making it an excellent choice for both beginners and advanced users.

### Conclusion

With its powerful tools and simple interface, **Minitab** stands as a reliable software for statistical analysis and quality improvement, making it an indispensable resource in both academic and professional contexts

### Types of interfaces:

#### 1-Worksheet (Data window)

The Worksheet (Data window) is where you enter and manage your data (similar to an Excel sheet). It consists of columns (C1, C2, ...) that you can name for variables. It supports different data types (numeric, text, date), data cleaning and transformations, and missing-value handling. Multiple worksheets can be open in a project; each worksheet can hold constants and matrices. Analyses reference the active worksheet's columns.

#### 2-Session / Output window

The Session (or Output) window shows textual output: statistical tables, test results, model summaries, and system/error messages. It's useful for checking numeric details and assumptions. You can copy text from it into reports. In newer versions, the output may appear in a pane that can be shown or hidden within the project interface.

#### 3- Graph windows (Charts & Graphs)

Graphs open in separate windows; each chart is editable (titles, axes, labels) and can be saved as an image. There are tools (Graph Layout) to arrange multiple graphs together or place several plots on one page. Use the Graph Editor to change visual elements after creation.

#### 4-Navigator / Project Manager

The Navigator (Project Manager) lists all outputs, graphs, and reports in your project from oldest to newest. You can reorder, delete, or save items. There's an option to group outputs by worksheet to see which results are associated with which columns—very helpful for organized projects.

View > Project Manager

#### 5-Minitab Assistant

The Minitab Assistant is a guided interface that walks you through selecting the correct analysis, completing dialog boxes, and checking assumptions (e.g.,

normality, equal variances). It produces simplified reports that help interpret results and includes graphical diagnostics—ideal for beginners or for quick interpretation.

### الخطوات:

1. افتح برنامج **Minitab**.
2. من القائمة العلوية، اختر:

Assistant

خطوة	الإجراء
1	افتح Minitab
2	اختر <b>Assistant</b> من القائمة العلوية
3	أو <b>Tools &gt; Assistant</b>
4	اختر نوع التحليل واتبع الإرشادات خطوة بخطوة

### 6- Menus, Toolbars & Dialog boxes

The Menus (Stat, Graph, Calc, Editor, etc.) and toolbars give access to all functions. Selecting a tool opens a dialog box where you enter variables and options for the analysis. Some newer versions have ribbon-like elements, but the core workflow relies on detailed dialog boxes for each analysis.

### 7-Command Line, History & Macros

You can view the Minitab commands you've run in the Session window and save them for later use or to create a macro to automate analyses. Minitab supports simple scripting (MTB macros or command sequences) to repeat procedures across datasets or to automate an entire reporting workflow.

### Saving a project (.MPJ): The difference between saving a document and saving a project

حفظ المشروع (.MPJ) الاختلاف بين حفظ الورقة وحفظ المشروع

Saving a worksheet saves only the data; saving the project (.MPJ file) stores everything—worksheet, session results, graphs, and reports. Use project files to preserve the entire workflow and share or reopen exactly where you left off.

### Important notes

- استخدم Assistant إذا كنت مبتدئاً أو تريد تقريراً تفسيرياً سريعاً.
- رتب المخرجات في — Navigator استخدم Group by Worksheet لتتبع النتائج بسهولة .
- احفظ عملك كـ MPJ إذا أردت حفظ الرسوم والمخرجات مع البيانات .

المراجع (روابط للمصادر الرسمية)

- وصف واجهة Minitab و [support.minitab.com](http://support.minitab.com) Components.
- دليل [minitab.com+1](http://minitab.com+1) (Minitab 19 / 20). *Getting Started*
- صفحة الشرح التفصيلي للـ [support.minitab.com](http://support.minitab.com) Worksheets.

## **Types of Variables in Minitab**

### **1) Numeric Variables**

Numeric variables contain numeric values that can be used in mathematical and statistical calculations. Examples: height, weight, income, exam scores.

- **Advantages:** Mean, standard deviation, and hypothesis tests can be applied.
- **In Minitab:** Stored in standard numeric columns (C1, C2, ...).

Suppose we have data for **the weights of a group of people (in kilograms)** entered in the first column (C1) of the worksheet:

#### **C1 (Weight)**

65  
70  
68  
75  
80  
72

#### **Steps in Minitab:**

1. To enter the data:
  - From the **Editor** menu, select **Insert Column** to add a new column.
  - Type the data manually or paste it from Excel.
2. To calculate **Descriptive Statistics** (mean, standard deviation, ...):
  - Go to **Stat > Basic Statistics > Display Descriptive Statistics**
  - Select the column (C1: Weight)
  - Click OK
3. The result in the Session window might look like

#### *Descriptive Statistics: Weight*

*Variable N Mean StDev Minimum Maximum*

*Weight 6 71.67 5.57 65 80*

## 2) Text (String) Variables

Text variables contain strings or characters (e.g., student names, city names, product codes). They cannot be used in numeric calculations directly but are useful for classification or grouping in analyses.

Suppose we have data about **the cities** where a group of people live, along with their ages:

### **C1 (City) C2 (Age)**

Baghdad	25
Mosul	30
Basra	28
Baghdad	32
Basra	26

- **C1 (City)** is a **Text Variable**.
- **C2 (Age)** is a **Numeric Variable**.

### **Steps (Commands):**

1. Enter the data:
  - From **Editor > Insert Column**, enter the text values in the first column.
  - By default, Minitab recognizes the column as **Text** if values are non-numeric.
2. To count the frequency of people in each city:
  - Go to **Stat > Tables > Tally Individual Variables**
  - Select column **C1 (City)**
  - Click **OK**
3. The output in the Session window will be

*Tally for Discrete Variables: City*

<i>City</i>	<i>Count</i>
<i>Baghdad</i>	<i>2</i>
<i>Mosul</i>	<i>1</i>
<i>Basra</i>	<i>2</i>

## 3) Date/Time Variables

Date/Time variables store calendar dates and times (e.g., 20/09/2025 or 14:30). They are used for time series analysis, trends, and seasonality studies.

Suppose we have data about **student registration dates** in a training course along with their ages:

## C1 (Date of Registration) C2 (Age)

01/01/2024	25
15/01/2024	30
20/02/2024	28
05/03/2024	32
10/03/2024	26

- C1 (Date of Registration) is a Date/Time Variable.
- C2 (Age) is a Numeric Variable.

## Commands:

1. **Enter data:**
  - From **Editor > Insert Column**, enter dates (Day/Month/Year format).
  - Minitab automatically recognizes the column as **Date/Time**.
2. **Extract components from dates (e.g., month only):**
  - Go to **Data > Change Data Type > Extract from Date/Time**
  - Select column **C1 (Date of Registration)**
  - Choose the part (e.g., Month)
  - Click **OK**
  - A new column will be created with the month number.
3. **Count number of registrations per month:**
  - From **Stat > Tables > Tally Individual Variables**
  - Select the new column (e.g., C3: Month)
  - Click **OK**

*Tally for Discrete Variables: Month*

*Month    Count*

*2        1*

*1        2*

*2        3*

## 4) Categorical (Nominal) Variables

Categorical (nominal) variables represent groups without any inherent order.

Examples:

- Gender (Male/Female)
- Car type (Toyota/Honda/Ford)

The categories are different but not ranked.

هذا المثال يوضح أن المتغيرات الفئوية (الاسمية) تُستخدم لتقسيم البيانات إلى مجموعات، ويمكن معها إجراء مقارنات إحصائية مثل ANOVA أو T-tests بين المجموعات.

Suppose we have data about **the car type** owned by a group of people, along with their **fuel consumption** (liters/100km)

## C1 (Car Type) C2 (Fuel Consumption)

Toyota	7.5
Honda	6.8
Ford	8.0
Toyota	7.2
Honda	6.9

- C1 (Car Type) is a **Nominal Categorical Variable**.
- C2 (Fuel Consumption) is a **Numeric Variable**.

## Commands:

1. **Enter the data:**
  - From **Editor > Insert Column**, enter car names in column C1.
  - Enter numeric values for fuel consumption in column C2.
2. **Calculate mean by category (ANOVA or Descriptive by Factor):**
  - Go to **Stat > ANOVA > One-Way**
  - In **Response**, select **C2 (Fuel Consumption)**
  - In **Factor**, select **C1 (Car Type)**
  - Click **OK**
3. **The output in the Session Window will be similar to**

*One-way ANOVA: Fuel Consumption versus Car Type*

Car Type	N	Mean	StDev
Toyota	2	7.35	0.21
Honda	2	6.85	0.07
Ford	1	8.00	*

## 5) Ordinal Variables

Ordinal variables are categorical variables with a meaningful order. Examples:

- Education level (Primary – Secondary – University – Postgraduate)
- Satisfaction level (Low – Medium – High)

The categories have order, but the differences between levels may not be equal.

هذا المثال يوضح أن المتغيرات الترتيبية تُستخدم عندما تكون الفئات مرتبة، لكنها ليست كمية (لا نستطيع حساب الفرق بين "راضٍ" و"راضٍ جدًا" كأرقام دقيقة).

Suppose we collected data on **customer satisfaction with a service**, using a Likert scale

**C1 (Satisfaction Level) C2 (Age)**

Very Satisfied	25
Satisfied	30
Neutral	28
Dissatisfied	32
Very Dissatisfied	27
Satisfied	29

- **C1 (Satisfaction Level)** is an **Ordinal Variable** because the categories have a natural order.
- **C2 (Age)** is a **Numeric Variable**.

**Commands:**

1. **Enter the data:**
  - From **Editor > Insert Column**, enter satisfaction levels in column C1.
  - Minitab recognizes them as **Text Variables**, which can be converted.
2. **Convert to Ordinal Variable:**
  - Go to **Data > Change Data Type > Convert Text to Categorical**
  - Select column C1.
  - Then go to **Data > Change Data Type > Make Ordinal**
  - Define the order (Very Dissatisfied → Dissatisfied → Neutral → Satisfied → Very Satisfied).
3. **Frequency distribution:**
  - From **Stat > Tables > Tally Individual Variables**
  - Select column C1 (Satisfaction Level)
  - Click **OK**

**Session Window Output**

*Tally for Discrete Variables: Satisfaction Level*

<i>Satisfaction Level</i>	<i>Count</i>
<i>Very Dissatisfied</i>	<i>1</i>
<i>Dissatisfied</i>	<i>1</i>
<i>Neutral</i>	<i>1</i>
<i>Satisfied</i>	<i>2</i>
<i>Very Satisfied</i>	<i>1</i>

## 6) Binary (Dichotomous) Variables

Binary variables are a special type of categorical variable with only two categories (Yes/No, Success/Failure, 0/1). They are widely used in logistic regression and classification tasks.

هذا المثال يوضح كيفية استخدام المتغيرات الثنائية في Minitab لتصنيف البيانات وإجراء تحليلات مقارنة بين المجموعتين مثل اختبار t ثنائي العينة)

Suppose we have data on **students' pass/fail status** in a test:

### C1 (Pass/Fail) C2 (Score)

Pass	85
Fail	55
Pass	78
Pass	92
Fail	60

- **C1 (Pass/Fail)** is a **Binary Variable** because it has only two categories (Pass / Fail).
- **C2 (Score)** is a **Numeric Variable**.

### Commands:

1. **Enter the data:**
  - From **Editor > Insert Column**, enter the binary values (Pass / Fail) in column C1.
  - Enter numeric scores in column C2.
2. **Count number of Pass and Fail students:**
  - Go to **Stat > Tables > Tally Individual Variables**
  - Select column C1
  - Click **OK**
3. **Analyze relationship between Pass/Fail and scores (2-Sample t-test):**
  - Go to **Stat > Basic Statistics > 2-Sample t**
  - Select column C2 as **Response**
  - Select column C1 as **Grouping Variable**
  - Click **OK**

### Session Window Output Example

Tally for Discrete Variables: Pass/Fail

Pass/Fail Count

Pass	3
Fail	2

Introduction to the Minitab program- Types of interfaces, types of variables  
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*Two-Sample T-Test: Score versus Pass/Fail*

*Group N Mean StDev*

*Pass 3 85.0 7.0*

*Fail 2 57.5 3.5*

### 7) Constants and Matrices in Minitab

In addition to standard columns, Minitab allows the use of **constants** (to store a single numeric value used repeatedly in analyses) and **matrices** (to store numeric arrays for advanced computations).

العربية هذا المثال يوضح كيفية استخدام الثوابت لإجراء عمليات ثابتة على العمود، وكذلك المصفوفات لإجراء عمليات على جدول كامل من البيانات في Minitab.

#### Constants

Suppose we want to add a **fixed tax of 10%** to product prices

##### C1 (Product Price)

100

150

200

- Here, **10%** is a **constant**.

#### 1-Commands:

1. Enter the data:
  - **Editor > Insert Column**, enter product prices in C1.
2. Define the constant:
  - Go to **Calc > Calculator**
  - Enter **Constant = 0.10**
  - Apply formula

$$C2 = C1 * (1 + 0.10)$$

- 

Click OK

	C2	Result	with	in	C2:
	(Price			Tax)	
		110			
		165			
	220				

**2-Matrices**

Suppose we have a matrix of sales for 3 products over 3 months

	Jan	Feb	Mar
Product1	50	60	55
Product2	40	45	50
Product3	30	35	40

**Commands:**

1. Go to **Data > Matrix > Create Matrix**, enter the values.
2. You can perform operations on the matrix:
  - o **Matrix > Calculator** to add, multiply, or compute row/column means.

Example: Sum of sales for each product (Row Sum)

**Matrix RowSum = sum(Matrix)**

الإيعازات (Commands)	مثال عملي	التعريف / Function	Type of Variable (English)	نوع المتغير (عربي)
<b>Stat &gt; Basic Statistics &gt; Display Descriptive Statistics</b>	درجات الطلاب: 85, 78, 90	متغير يحتوي على قيم رقمية يمكن استخدامها في العمليات الإحصائية والرياضية	Numeric	عددية
<b>Stat &gt; Tables &gt; Tally Individual Variables</b>	أسماء المدن : Baghdad, Mosul, Basra	متغير يحتوي على نصوص أو أحرف، يستخدم لتصنيف البيانات أو تقسيمها	Text / String	نصية
<b>Data &gt; Change Data Type &gt; Extract from Date/Time</b>	تاريخ التسجيل: 2024/01/01, 2024/02/15	متغير يحتوي على التواريخ أو الأوقات، يستخدم في التحليل الزمني	Date/Time	تاريخية
<b>Stat &gt; ANOVA &gt; One-Way</b>	نوع السيارة : Toyota, Honda, Ford	متغير يمثل فئات أو مجموعات بدون ترتيب منطقي	Categorical (Nominal)	فئوية (اسمية)
<b>Data &gt; Change Data Type &gt; Make Ordinal</b>	رضا العملاء : Very Dissatisfied → Very Satisfied	متغير فئوي له ترتيب منطقي بين الفئات	Ordinal	فئوية (ترتيبية)
<b>Stat &gt; Basic Statistics &gt; 2-Sample t</b>	Pass/Fail: Pass, Fail	متغير يحتوي على فئتين فقط (1/0، نعم/لا)	Binary / Dichotomous	ثنائية
<b>Calc &gt; Calculator → C2 = C1(1+0.10)*</b>	ضريبة ثابتة: 10 %	قيمة عددية واحدة تستخدم بشكل ثابت في العمليات الحسابية	Constants	ثابتة
<b>Data &gt; Matrix &gt; Create MatrixMatrix &gt; Calculator</b>	مبيعات 3 منتجات خلال 3 أشهر	جدول من القيم العددية يمكن إجراء عمليات رياضية عليه	Matric	

**ملاحظات مهمة:**

1. اختيار نوع المتغير الصحيح في Minitab أساسي للحصول على نتائج دقيقة.
2. بعض المتغيرات النصية أو التاريخية يمكن تحويلها إلى فئوية أو ترتيبية حسب التحليل المطلوب.
3. المتغيرات الثنائية مفيدة جداً في الانحدار اللوجستي والتصنيف.
4. المصفوفات والثوابت تسهل الحسابات المتقدمة والتحليلات الرياضية على مجموعة بيانات كاملة.