

PRO 3415 - Princípios de gestão da produção e logística

Prof. Marly Monteiro de Carvalho

Agenda - Minitab

- ⇒ Comandos Básicos
- ⇒ Estatística Descritiva
- ⇒ Mapa de Análise Estatística
 - Box Plot
 - Histograma
 - Diagrama de dispersão
 - Gráfico de série temporal
 - Pareto
- ⇒ Gráfico de controle

Minitab – Comandos Básicos (Tela)



Barra de ferramentas



Resultados



Dados



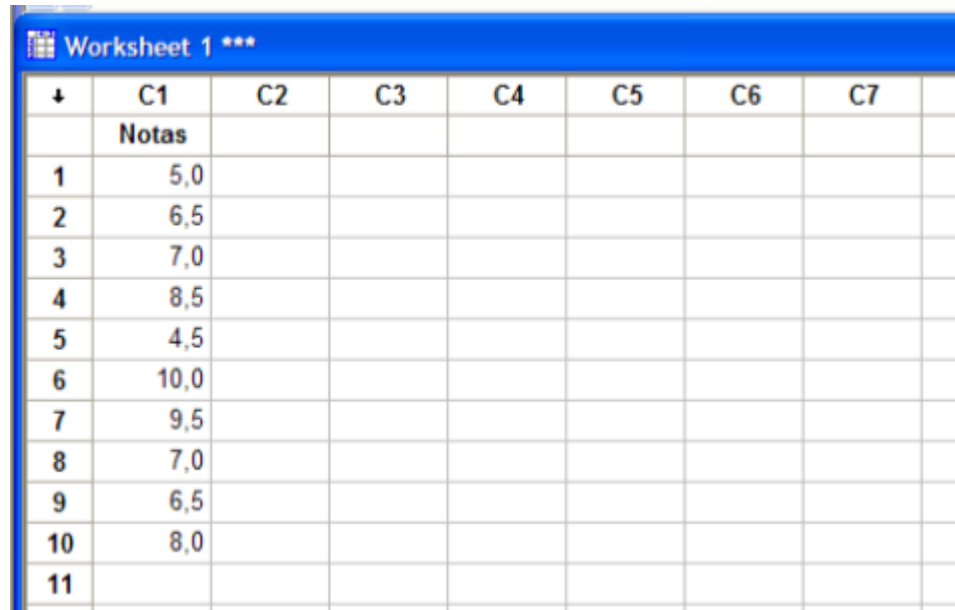
The screenshot displays the Minitab software interface. At the top is the menu bar with options: File, Edit, Data, Calc, Stat, Graph, Editor, Tools, Window, Help. Below the menu bar is a toolbar containing various icons for file operations, editing, and analysis. The main workspace is divided into two panes. The top pane, titled 'Session', shows a timestamp '20/8/2006 10:33:35' and a welcome message: 'Welcome to Minitab, press F1 for help.' The bottom pane, titled 'Worksheet 2 ***', shows a grid with columns labeled C1 through C16 and rows numbered 1 through 10. The grid is currently empty. At the bottom of the window, there is a status bar with the text 'Welcome to Minitab, press F1 for help.', 'Editable', and '12:15'. The Windows taskbar is visible at the very bottom, showing the 'Iniciar' button and several open applications: 'Minitab Guia', 'MINITAB - Exercícios ...', and the system tray with 'PT' and '12:15'.

Minitab – Comandos Básicos (Digitação de dados)

⇒ Na célula abaixo da coluna C1 digitar: notas

⇒ Nas linhas de 1 a 10 da coluna C1 digitar:

- 5,0
- 6,5
- 7,0
- 8,5
- 4,5
- 10,0
- 9,5
- 7,0
- 6,5
- 8,0
- 7,0
- 6,5
- 8,0

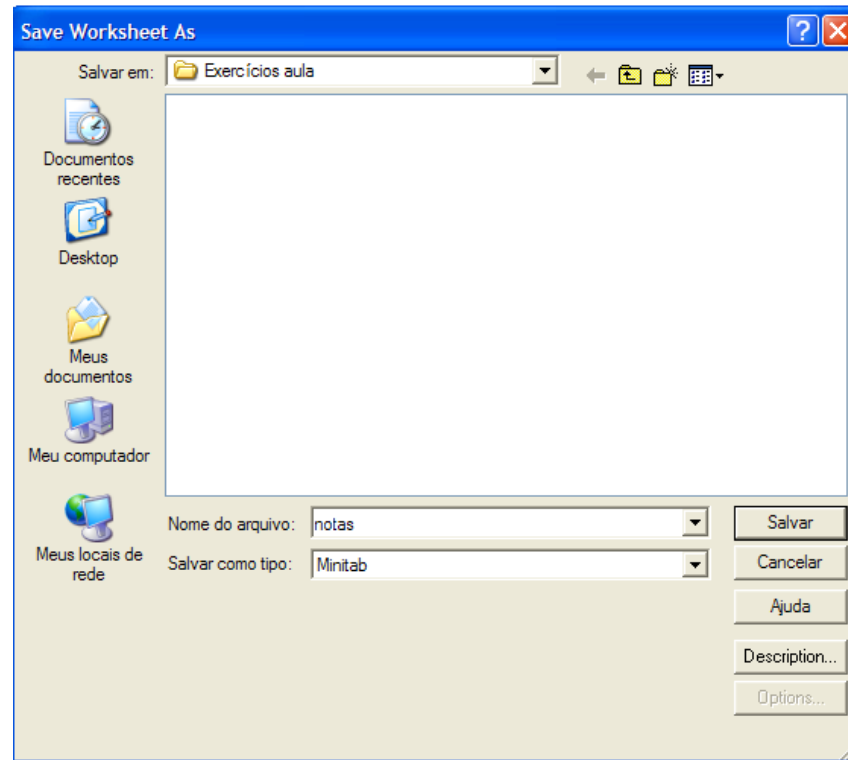
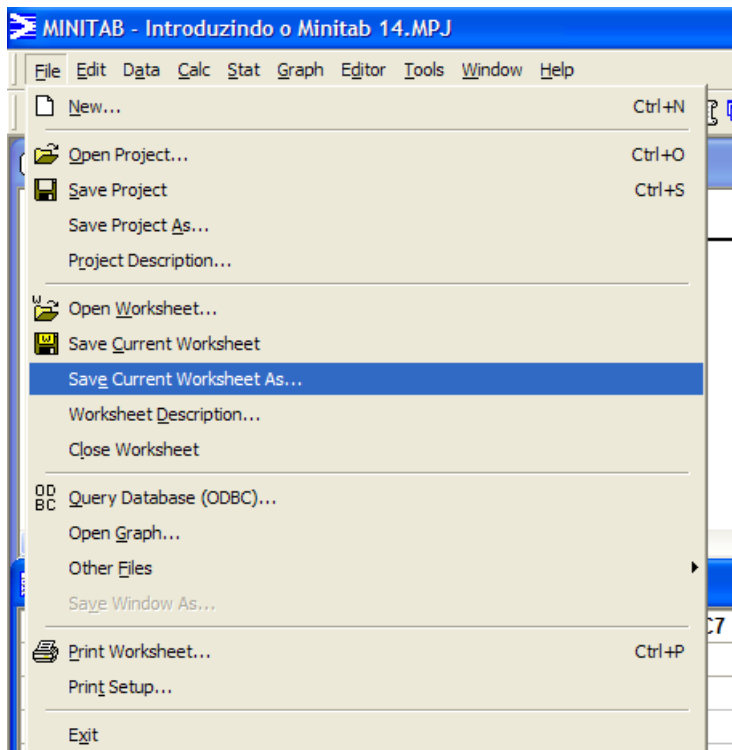


Worksheet 1 ***

↓	C1	C2	C3	C4	C5	C6	C7
	Notas						
1	5,0						
2	6,5						
3	7,0						
4	8,5						
5	4,5						
6	10,0						
7	9,5						
8	7,0						
9	6,5						
10	8,0						
11							

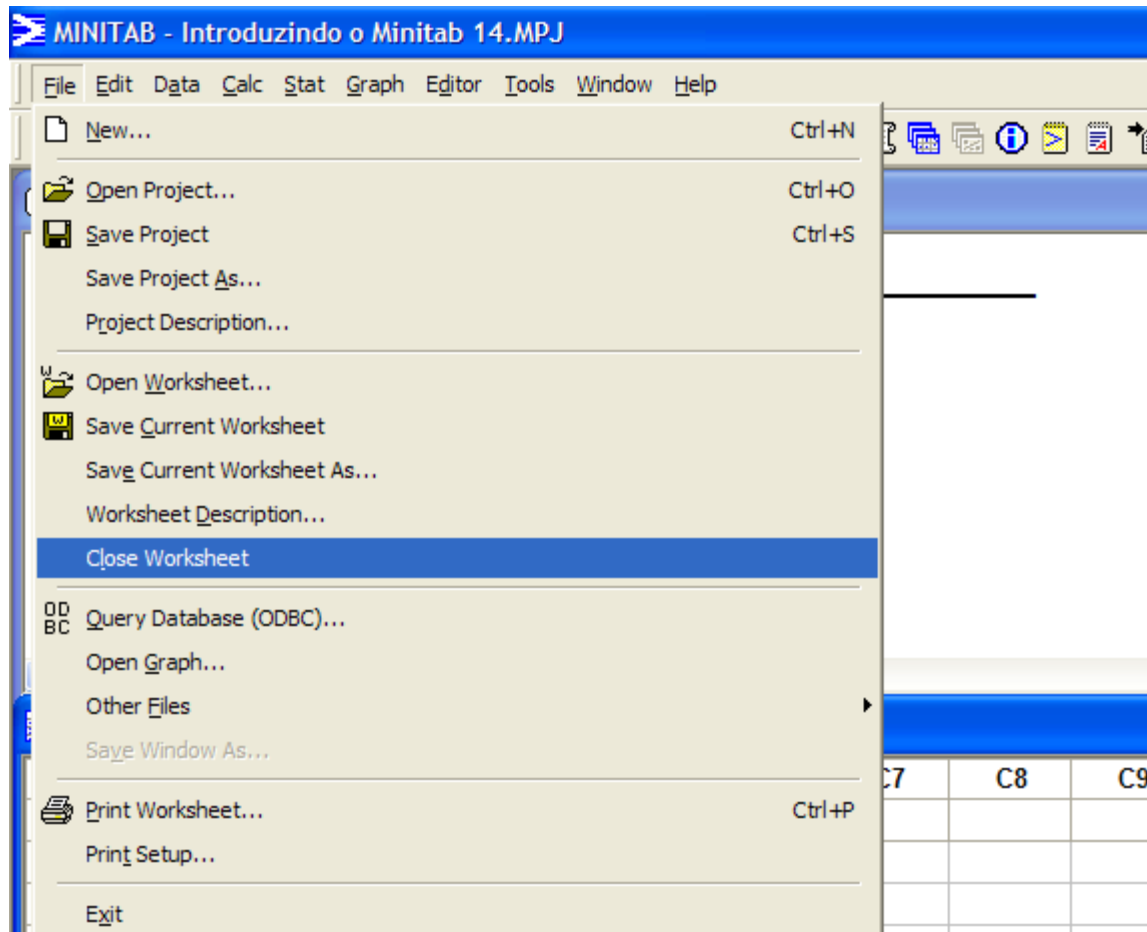
Minitab – Comandos Básicos (Salvar arquivo)

- ⇒ Selecionar: File > Save Current Worksheet As...
- ⇒ Digitar em “nome do arquivo”: notas
- ⇒ Pressionar: salvar



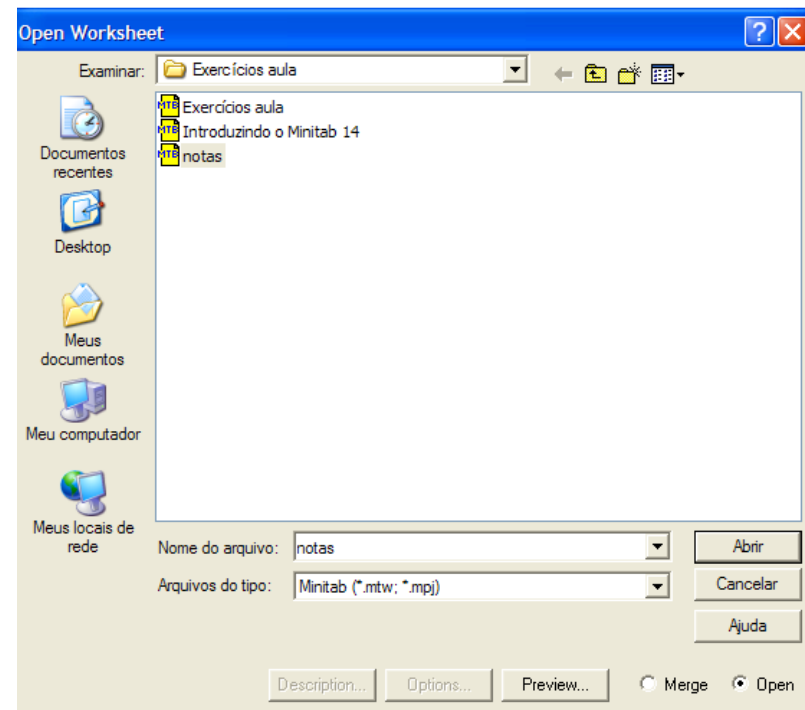
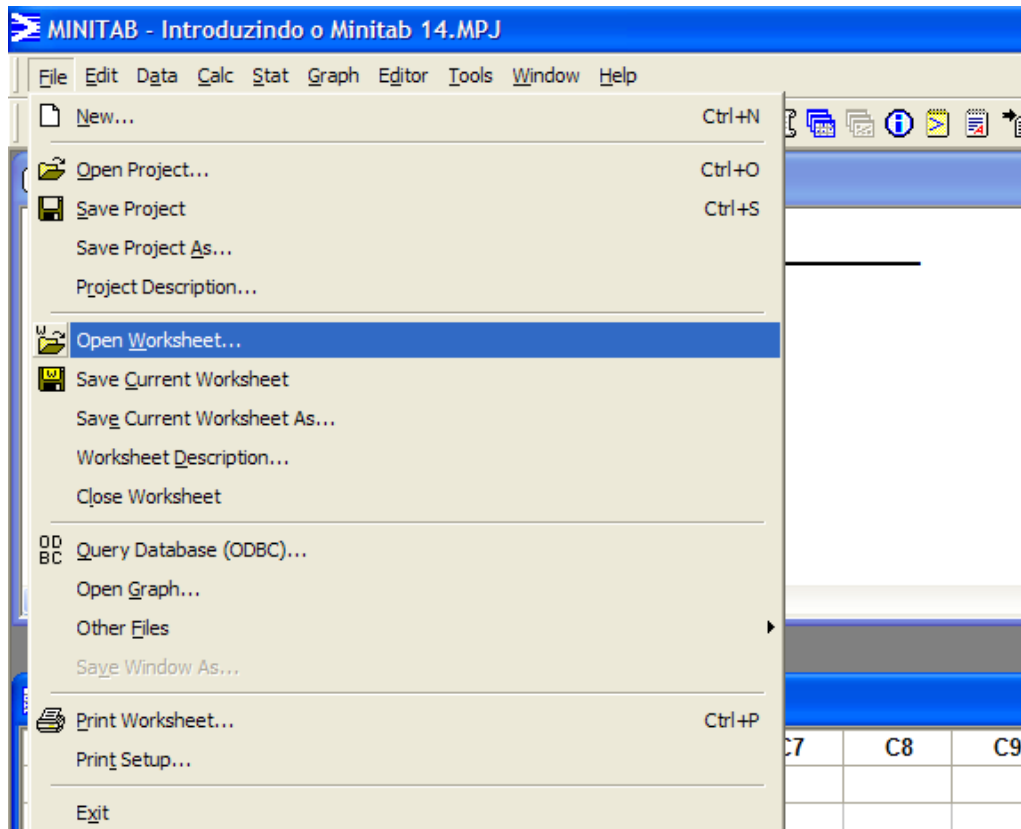
Minitab – Comandos Básicos (Fechar arquivo)

⇒ Selecionar: File > Close Worksheet

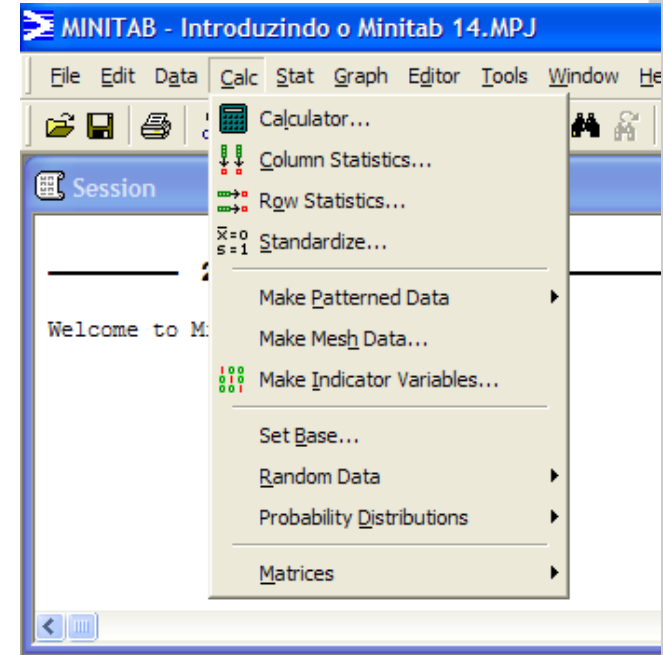
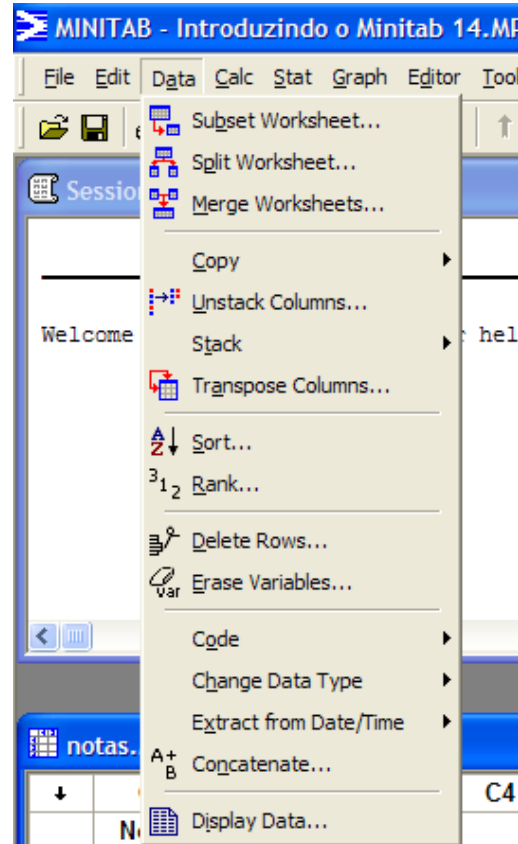
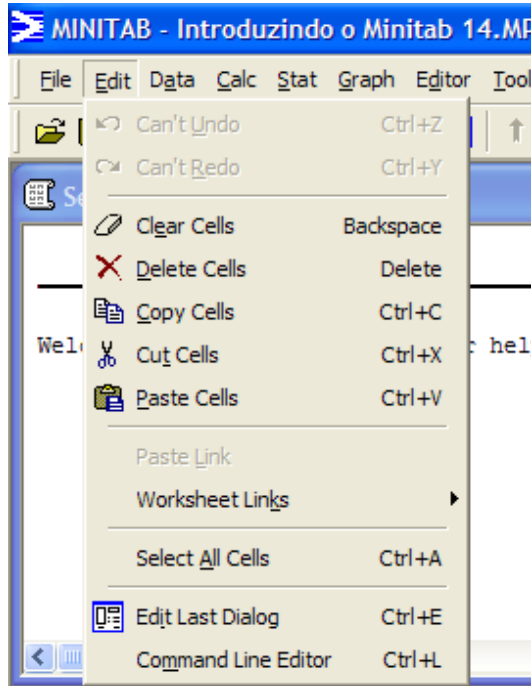


Minitab – Comandos Básicos (Abrir arquivo)

- ⇒ Selecionar: File > Open Worksheet
- ⇒ Digitar em “nome do arquivo”: notas
- ⇒ Pressionar: abrir

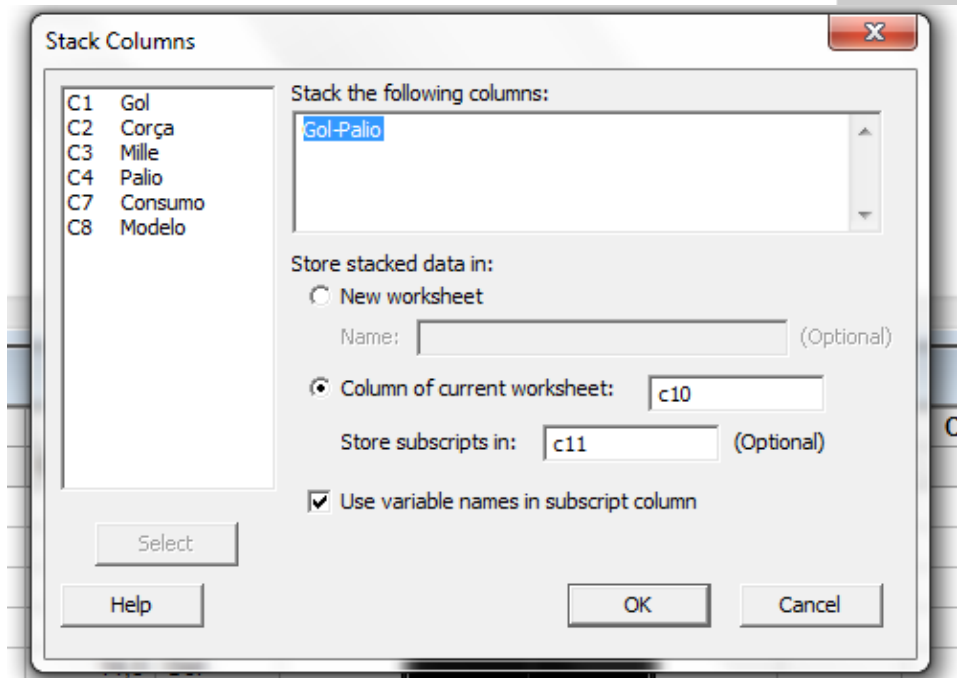
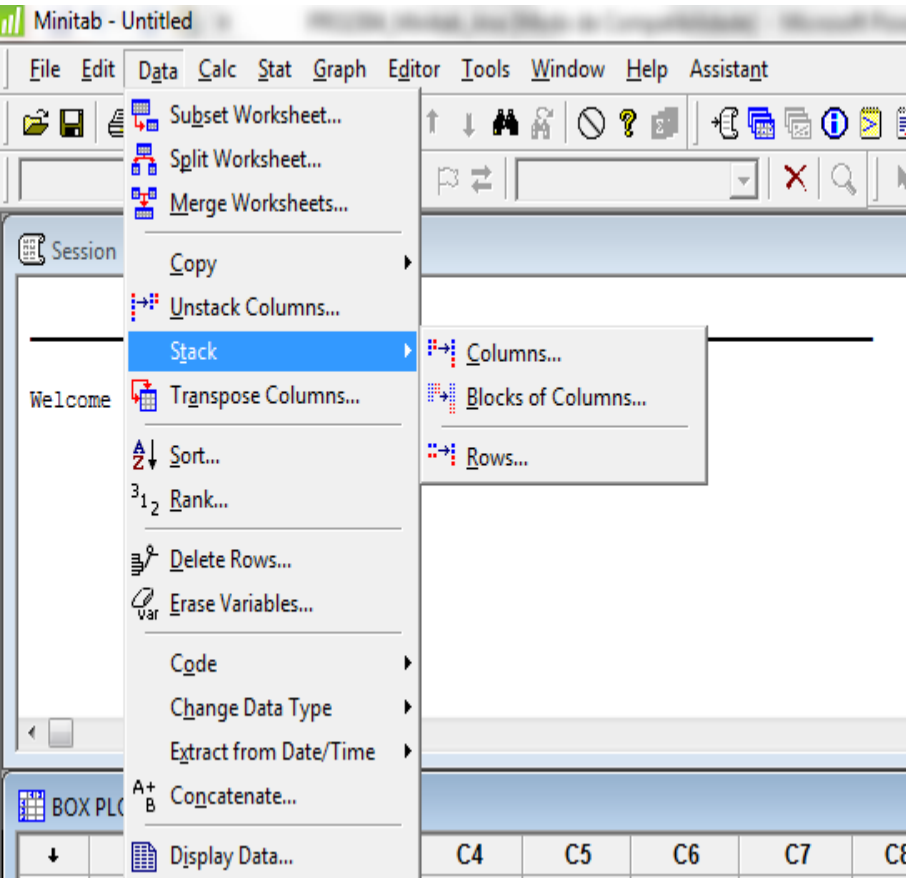


Minitab – Comandos Básicos (Barra de menus)



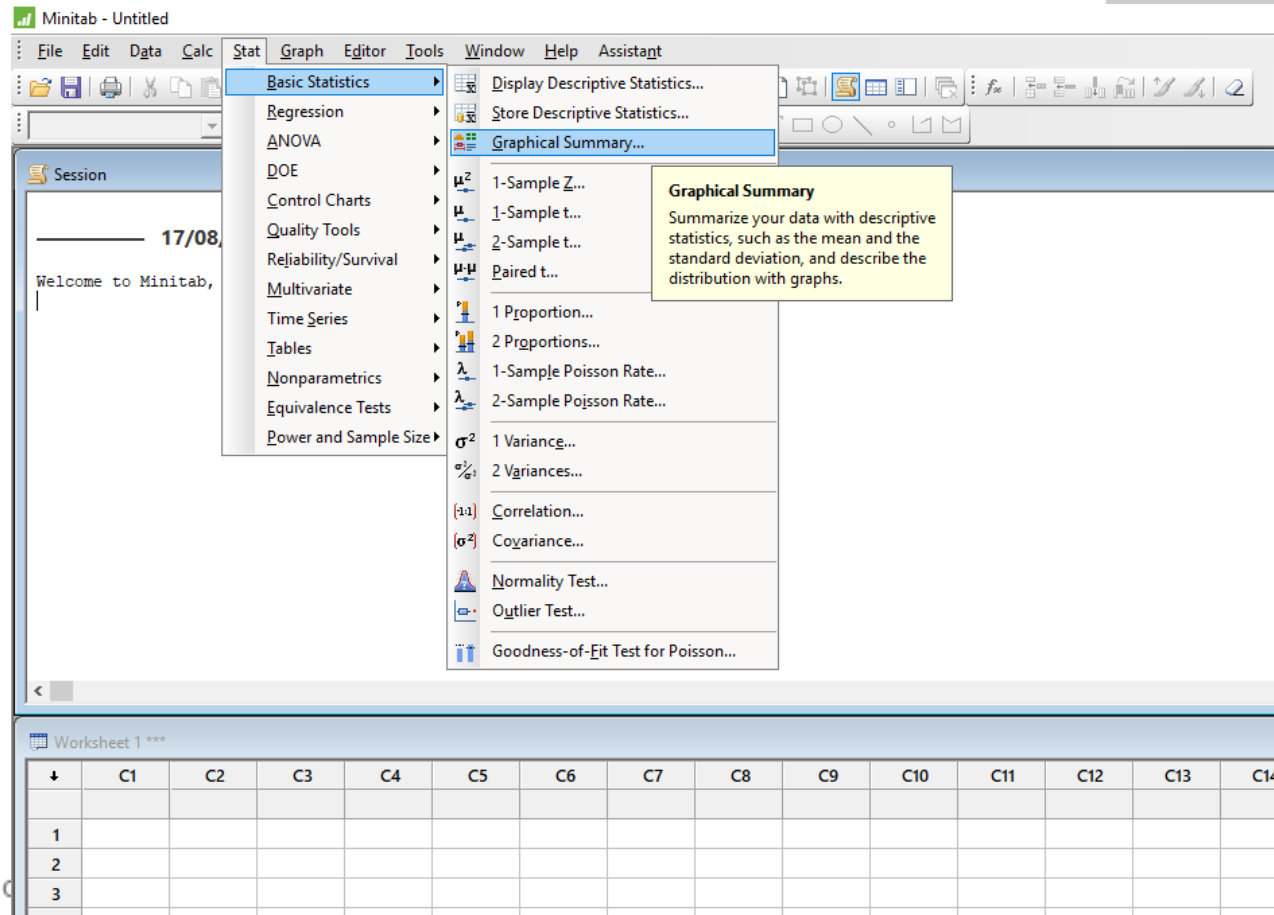
Minitab – Comandos Básicos (Empilhar dados)

⇒ Abrir arquivo Box Plot



Minitab – Estatística Descritiva

- ⇒ Fornece as estatísticas básicas: média, mediana, desvio etc
- ⇒ Abrir o arquivo: Histograma
- ⇒ Selecionar: Stat > Basic Statistics > Graphical Summary
- Variable: Atenden1

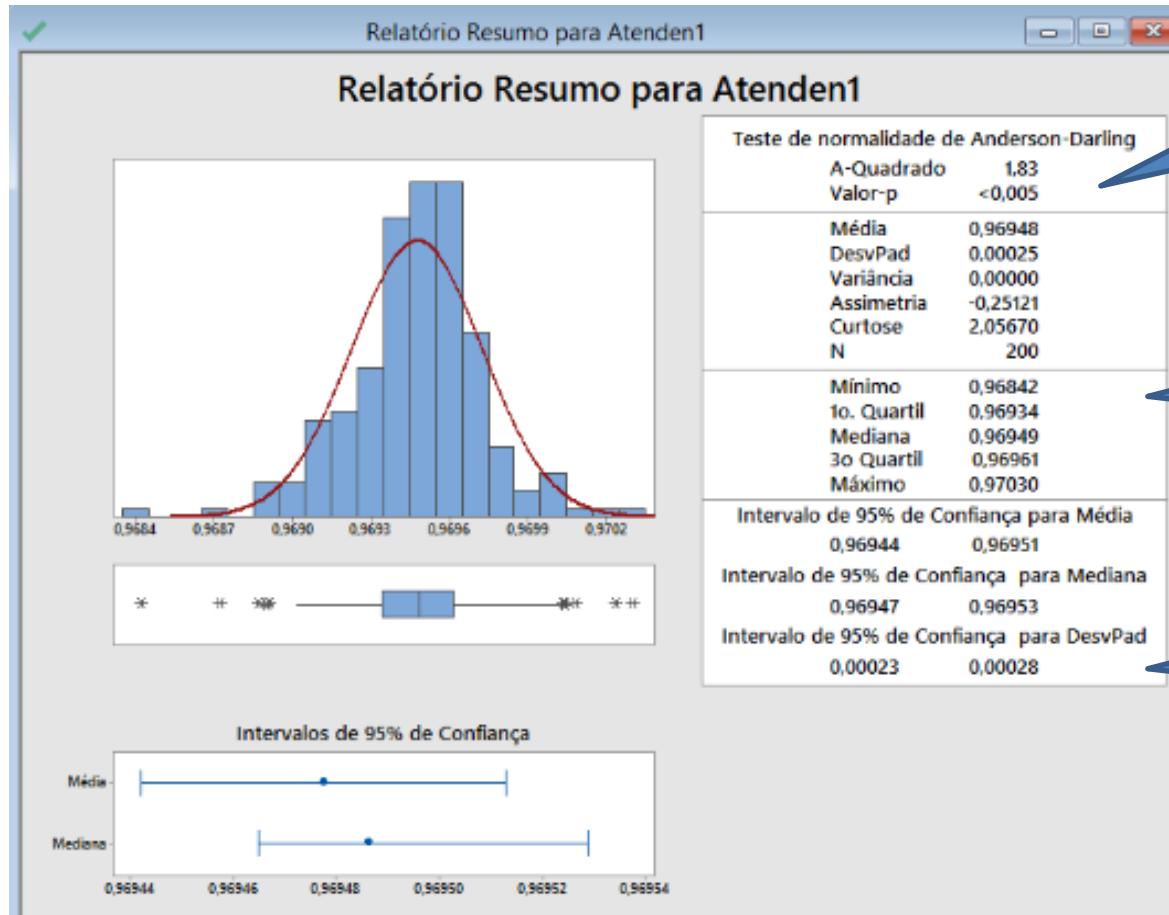


The screenshot shows the Minitab software interface. The 'Stat' menu is open, and the path 'Stat > Basic Statistics > Graphical Summary' is highlighted. A tooltip for 'Graphical Summary' is displayed, stating: 'Summarize your data with descriptive statistics, such as the mean and the standard deviation, and describe the distribution with graphs.'

The interface also shows a 'Session' window with the date '17/08' and a 'Worksheet 1 ***' window with columns C1 through C14 and rows 1 through 3.

Minitab – Estatística Descritiva

Graphical Summary



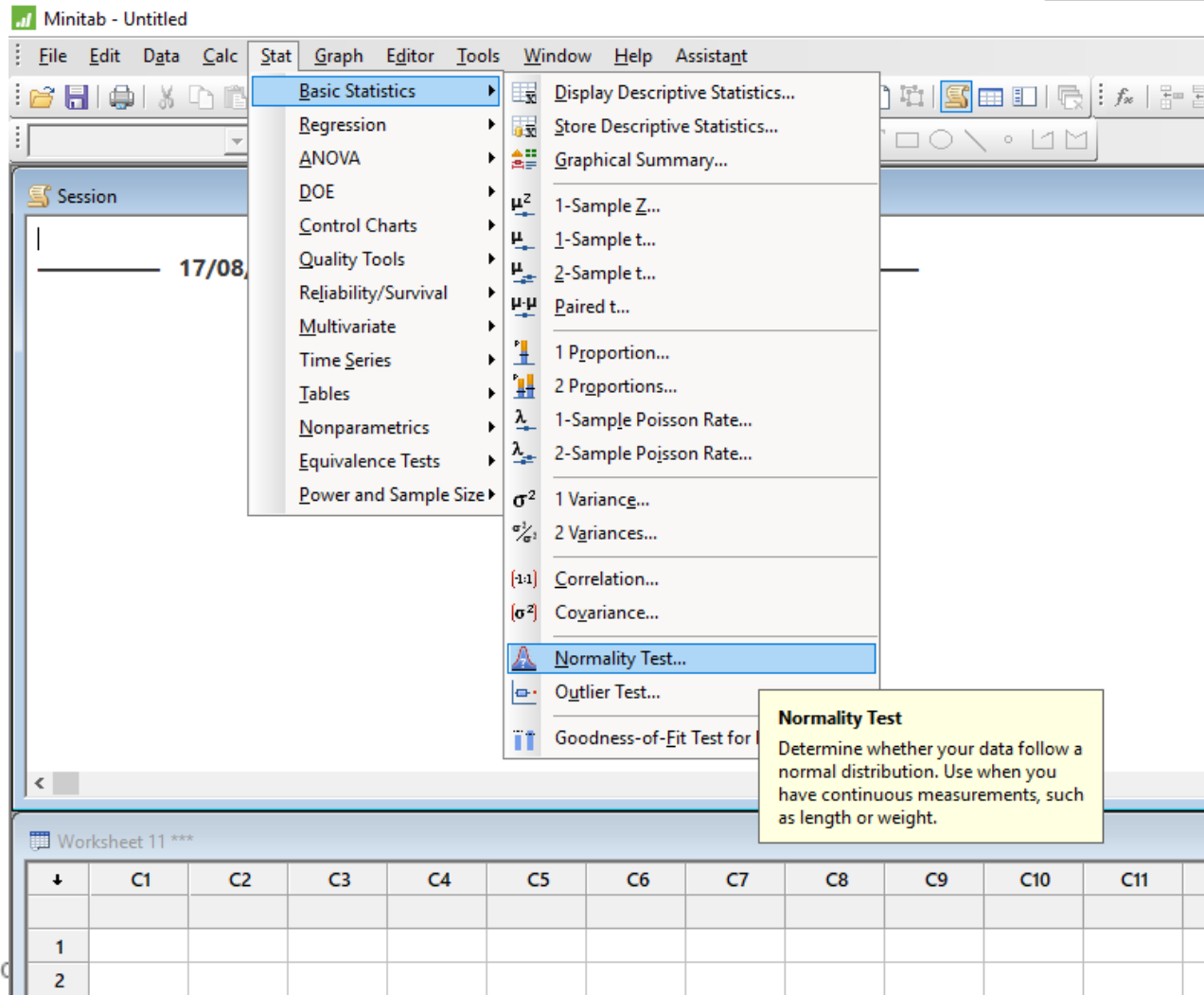
Teste de normalidade

Estatística descritiva

Intervalo de Confiança

Curva Normal – Teste de Normalidade

- Usando GRÁFICO DE CONTROLE
- Selecionar: Stat > Basic Statistics > Normality Test



The screenshot shows the Minitab software interface. The 'Stat' menu is open, and the 'Basic Statistics' submenu is selected. Within 'Basic Statistics', the 'Normality Test...' option is highlighted. A tooltip for 'Normality Test' is visible, explaining its purpose: 'Determine whether your data follow a normal distribution. Use when you have continuous measurements, such as length or weight.'

Minitab - Untitled

File Edit Data Calc Stat Graph Editor Tools Window Help Assistant

Basic Statistics

- Regression
- ANOVA
- DOE
- Control Charts
- Quality Tools
- Reliability/Survival
- Multivariate
- Time Series
- Tables
- Nonparametrics
- Equivalence Tests
- Power and Sample Size

- Display Descriptive Statistics...
- Store Descriptive Statistics...
- Graphical Summary...
- 1-Sample Z...
- 1-Sample t...
- 2-Sample t...
- Paired t...
- 1 Proportion...
- 2 Proportions...
- 1-Sample Poisson Rate...
- 2-Sample Poisson Rate...
- 1 Variance...
- 2 Variances...
- Correlation...
- Covariance...
- Normality Test...
- Outlier Test...
- Goodness-of-Fit Test for

Session

17/08

Worksheet 11 ***

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11
1											
2											

Curva Normal – Teste de Normalidade

- Usando GRÁFICO DE CONTROLE
- Selecionar: Stat > Basic Statistics > Normality Test
- “Variable”: < Voids > OK

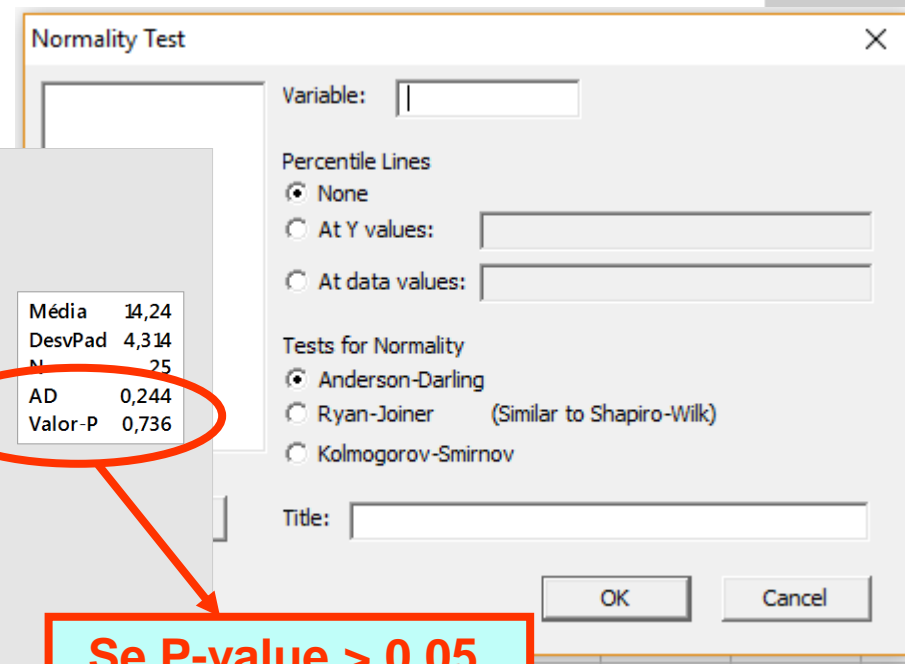
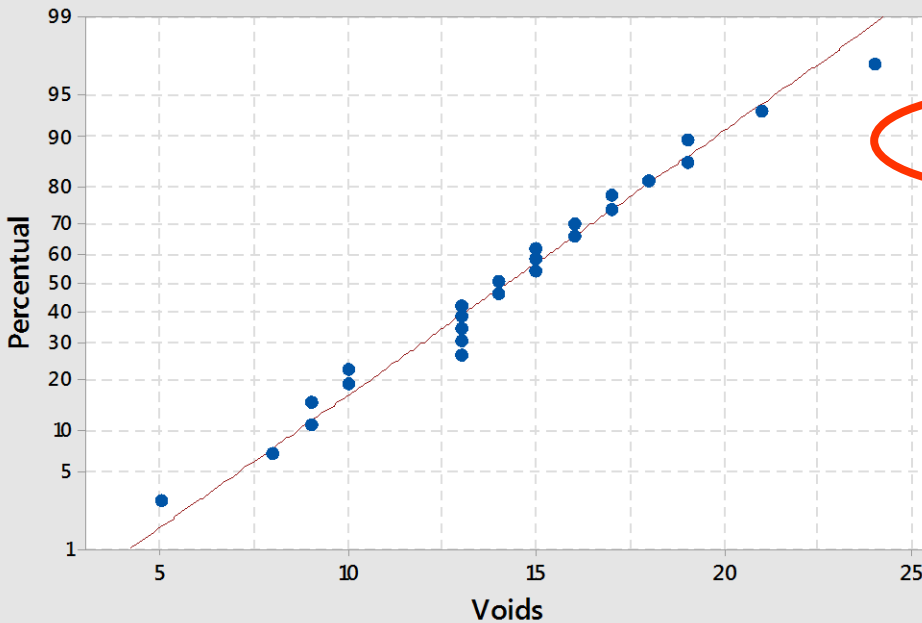


Gráfico de Probabilidade de Voids Normal

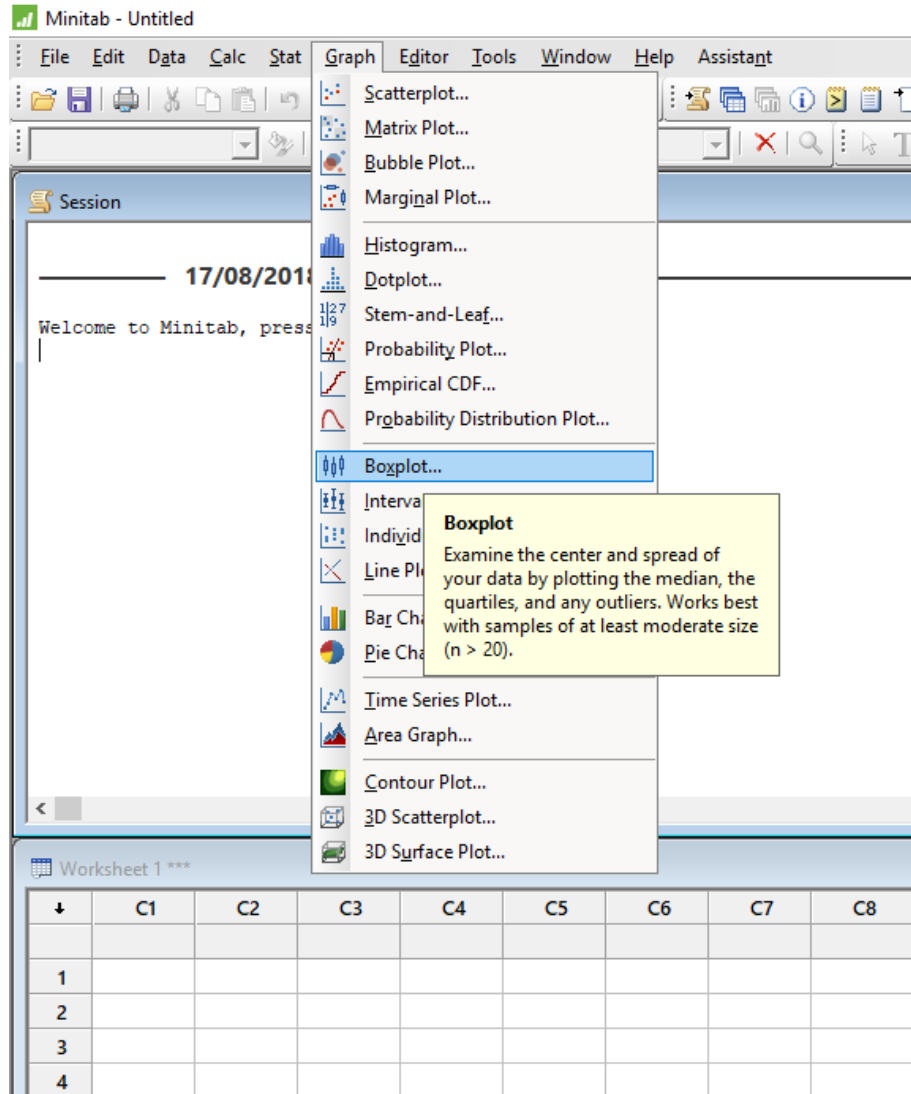


Média	14,24
DesvPad	4,314
N	25
AD	0,244
Valor-P	0,736

**Se P-value > 0,05,
então normal é
satisfatória**

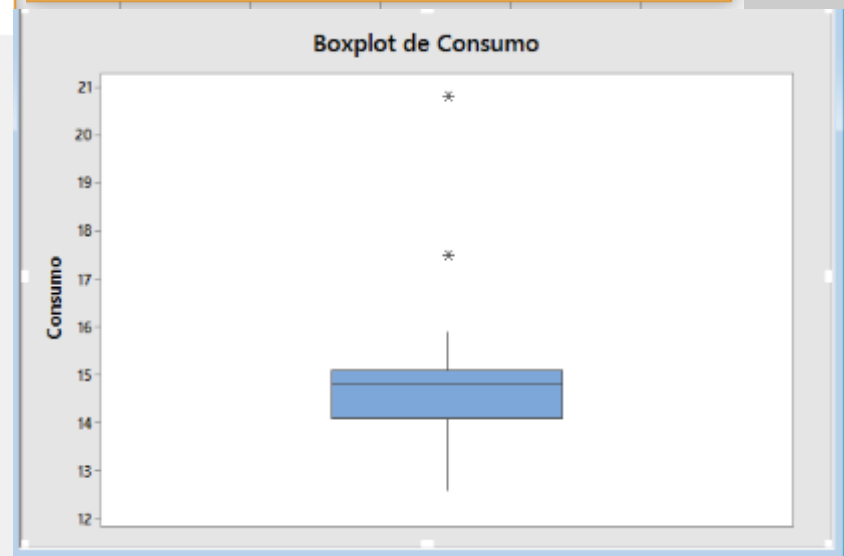
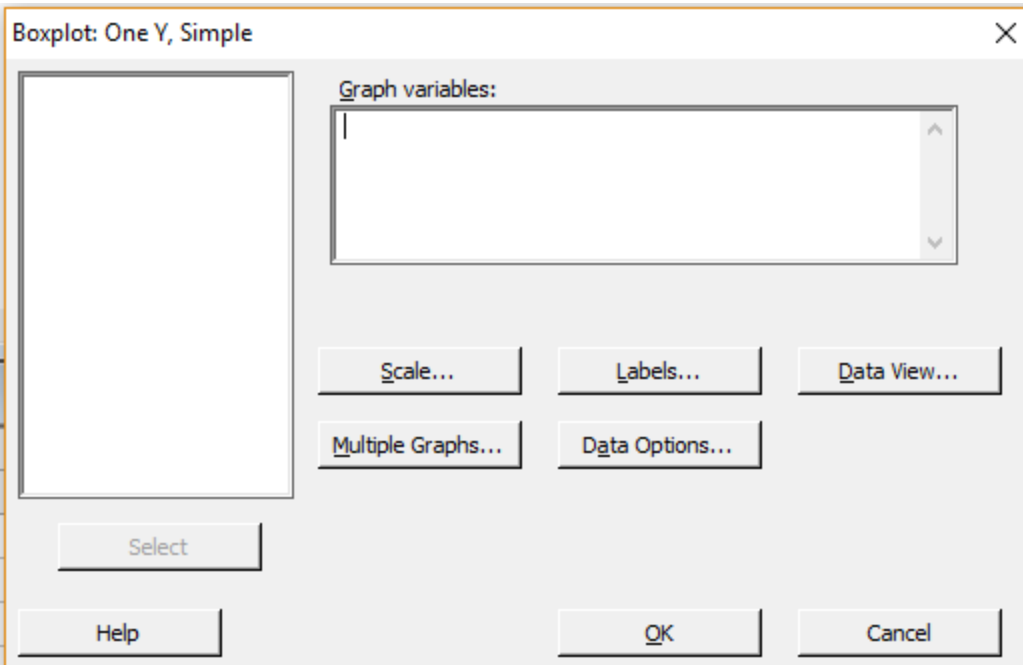
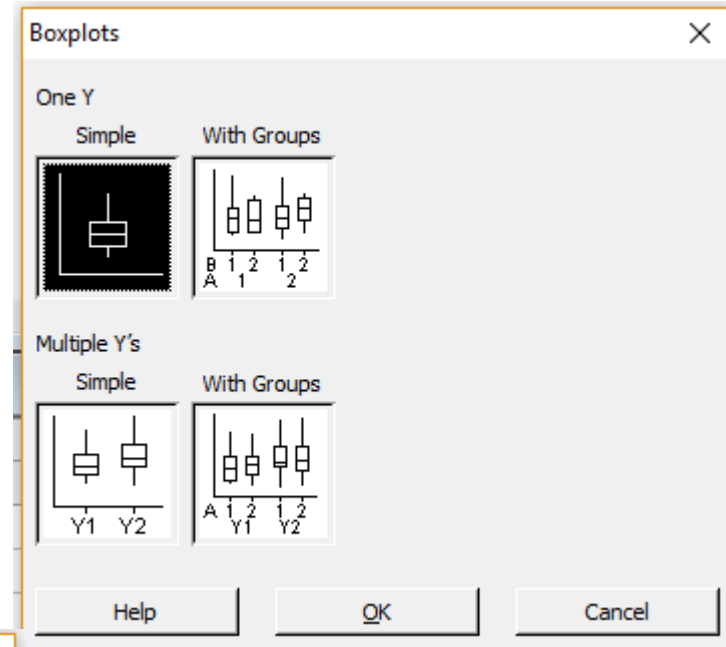
Minitab – Mapa de Análise Estatística (Box Plot)

- ⇒ Abrir o arquivo: Box Plot
- ⇒ Selecionar: Graph > Boxplot



Minitab – Mapa de Análise Estatística (Box Plot sem subgrupo)

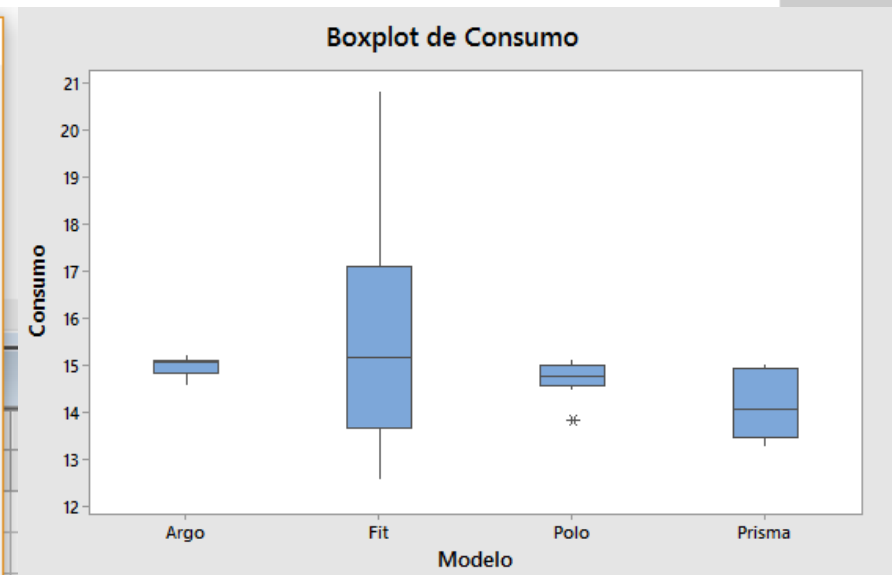
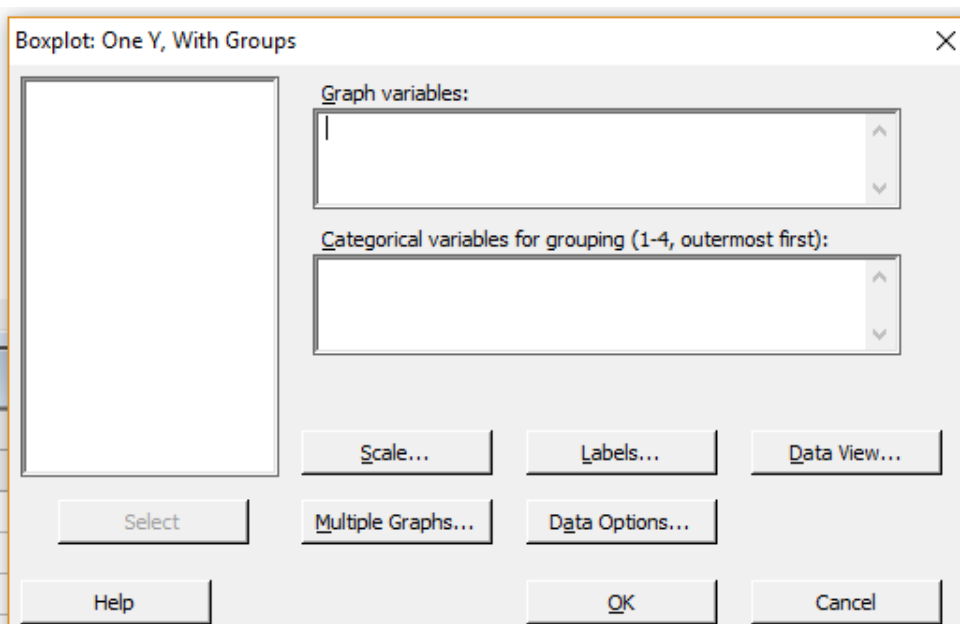
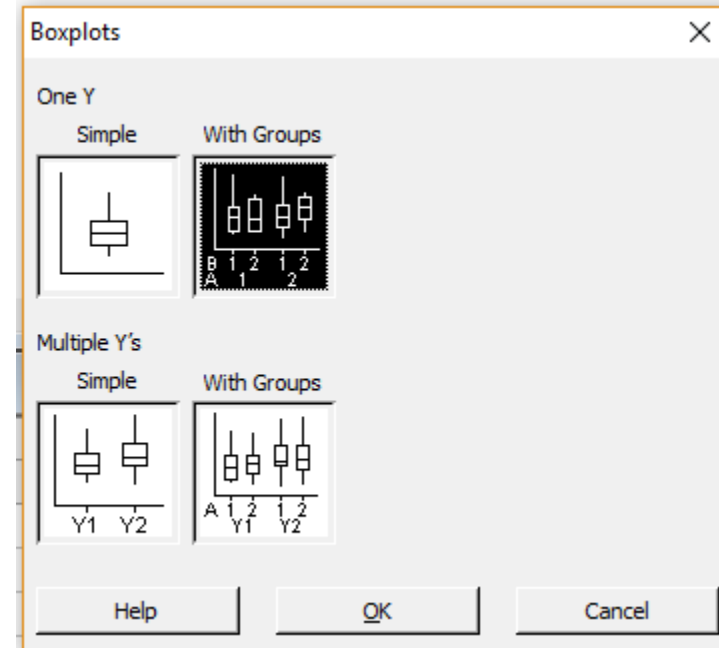
- ⇒ Abrir o arquivo: Box Plot
- ⇒ Selecionar: Graph > Boxplot
- ⇒ Escolher opção: One Y > Simple > OK
- Graph variable: consumo



Minitab – Mapa de Análise Estatística (Box Plot com subgrupo)



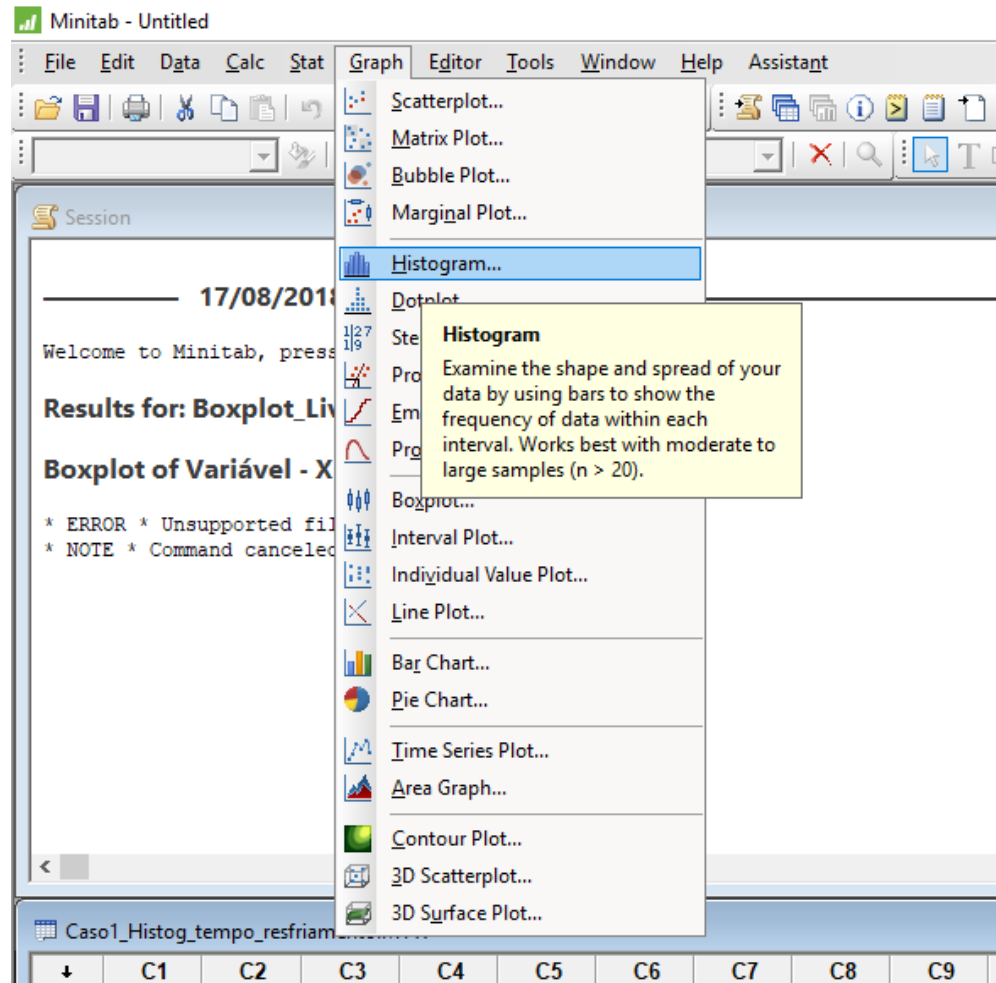
- ⇒ Abrir o arquivo: Box Plot
- ⇒ Selecionar: Graph > Boxplot
- ⇒ Escolher opção: One Y > with groups > OK
- Graph variable: consumo
- Categorical variables: modelo



Minitab – Mapa de Análise Estatística (Histograma)



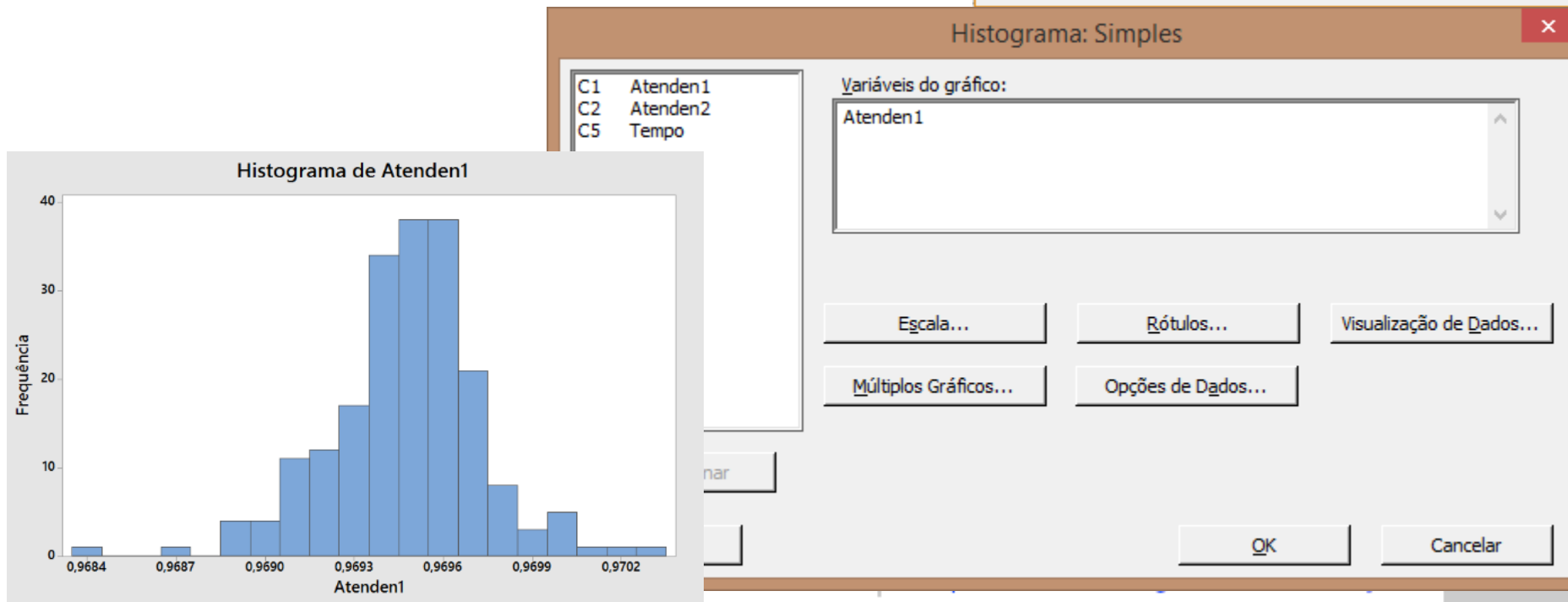
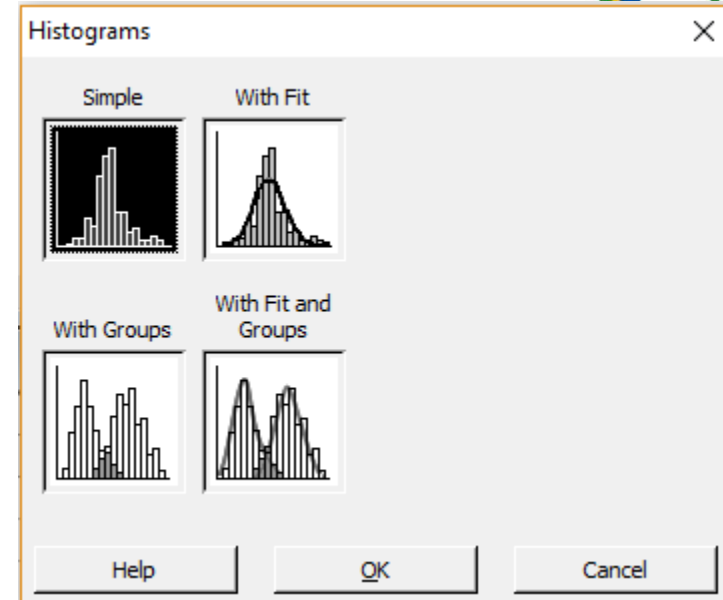
- ⇒ Abrir o arquivo: Histograma
- ⇒ Selecionar: Graph > Histogram>



Minitab – Mapa de Análise Estatística (Histograma Simples)



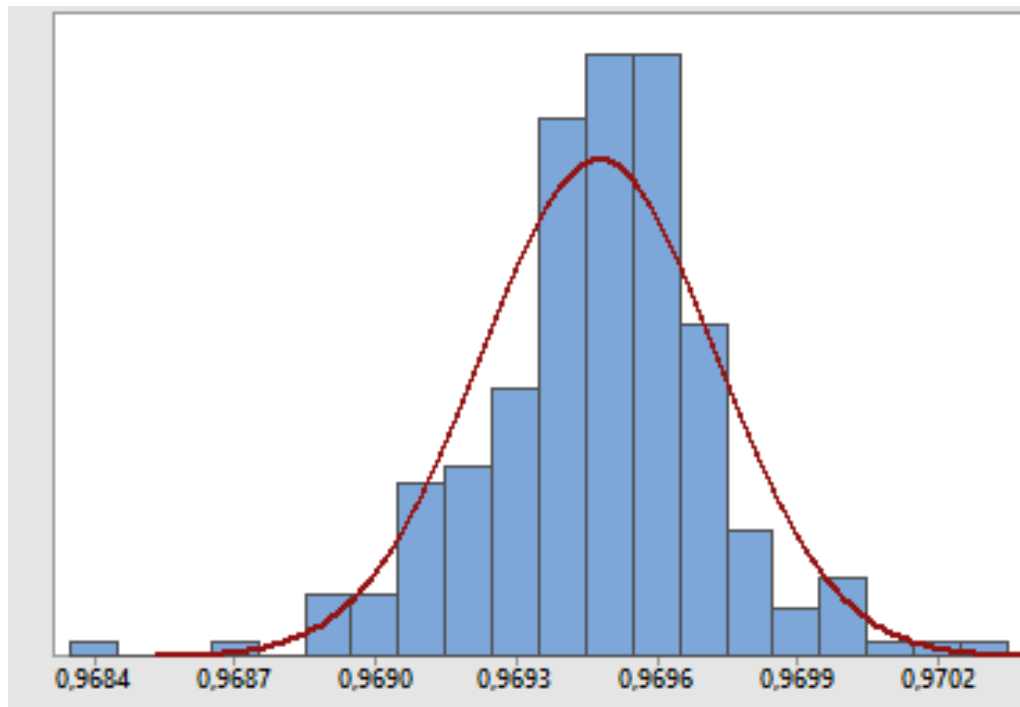
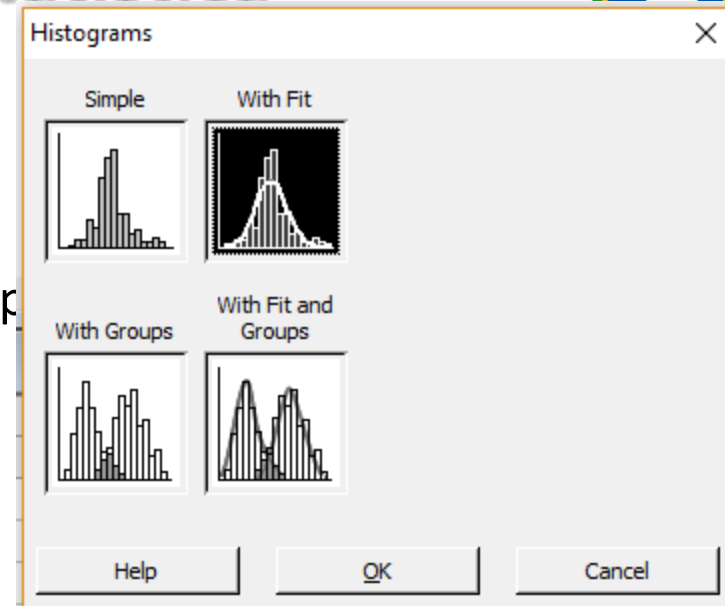
- ⇒ Abrir o arquivo: Histograma
- ⇒ Selecionar: Graph > Histogram>Simple
- By variable: Atenden1



Minitab – Mapa de Análise Estatística (Histograma com ajuste)

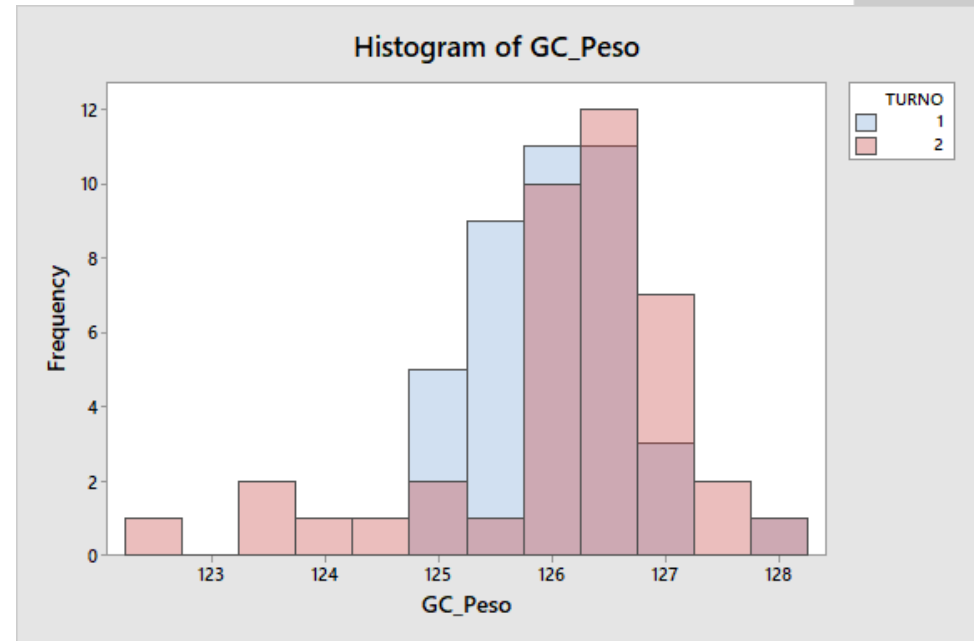
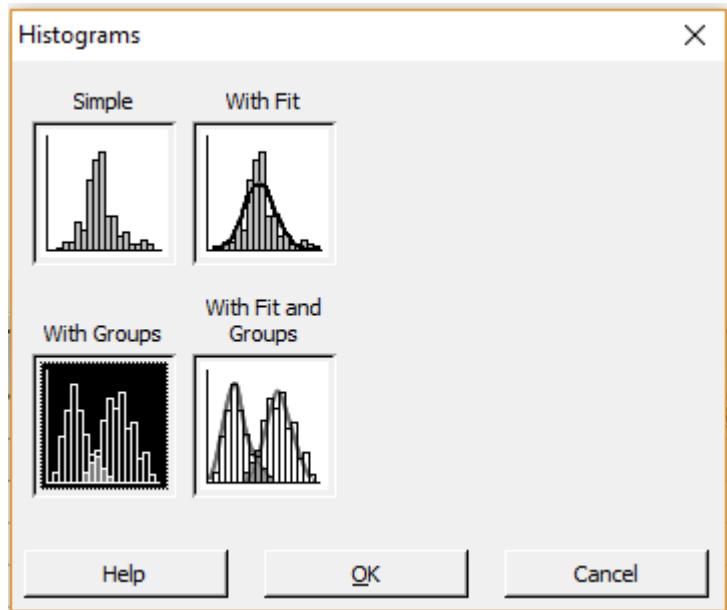


- ⇒ Abrir o arquivo: Histograma
- ⇒ Selecionar: Graph > Histogram>With fit and group
- By variable: Atenden1



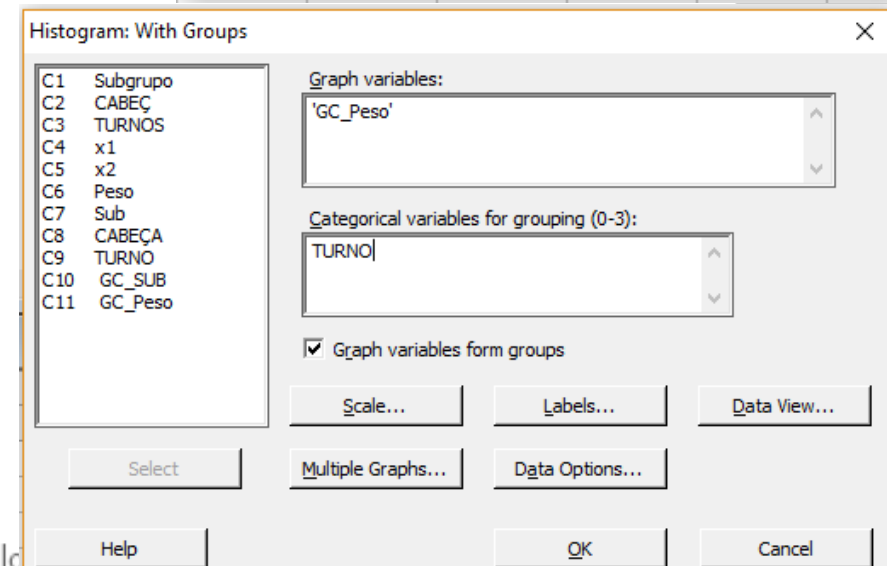
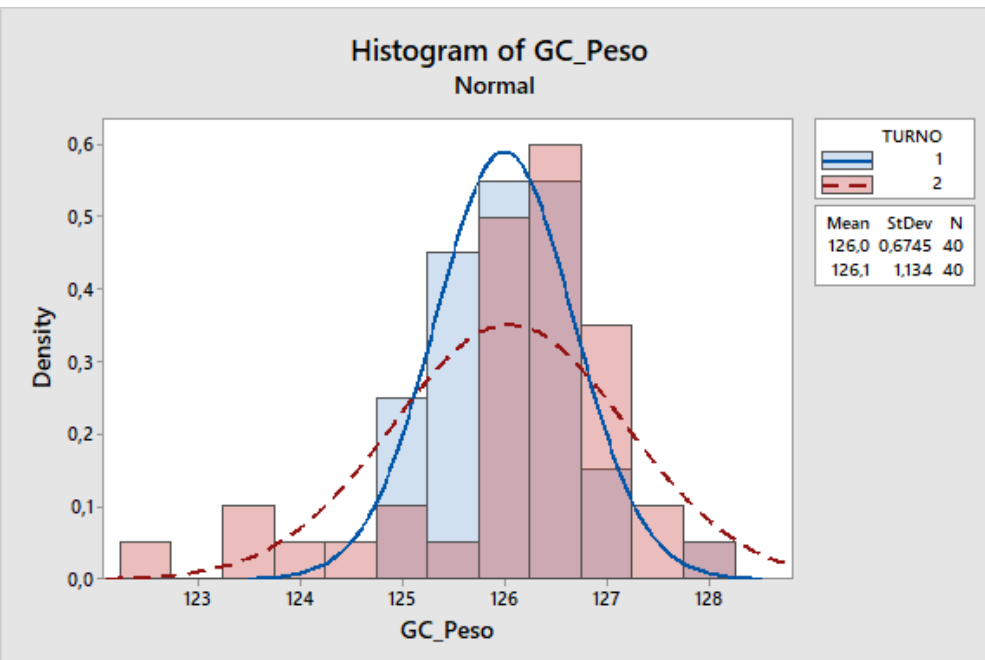
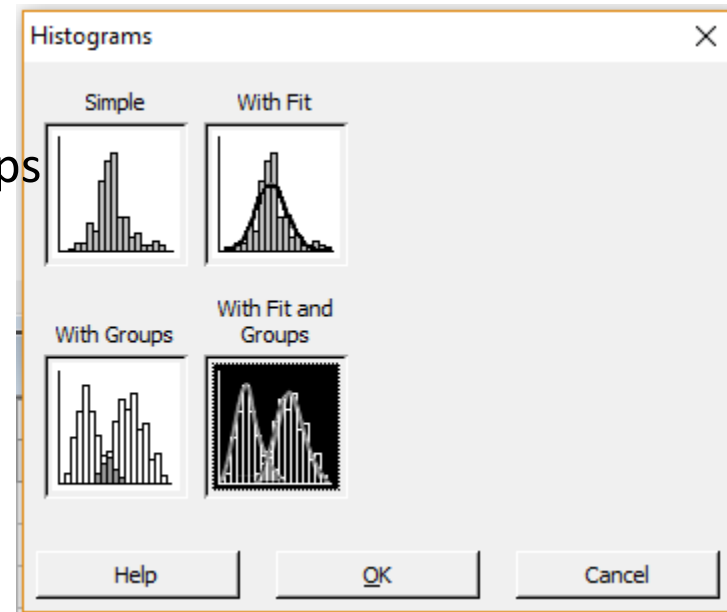
Minitab – Mapa de Análise Estatística (Histograma com subgrupo)

- ⇒ Abrir o arquivo
- ⇒ Selecionar: Graph > Histogram>With fit and groups
- By variable: selecionar variáveis a serem comparadas



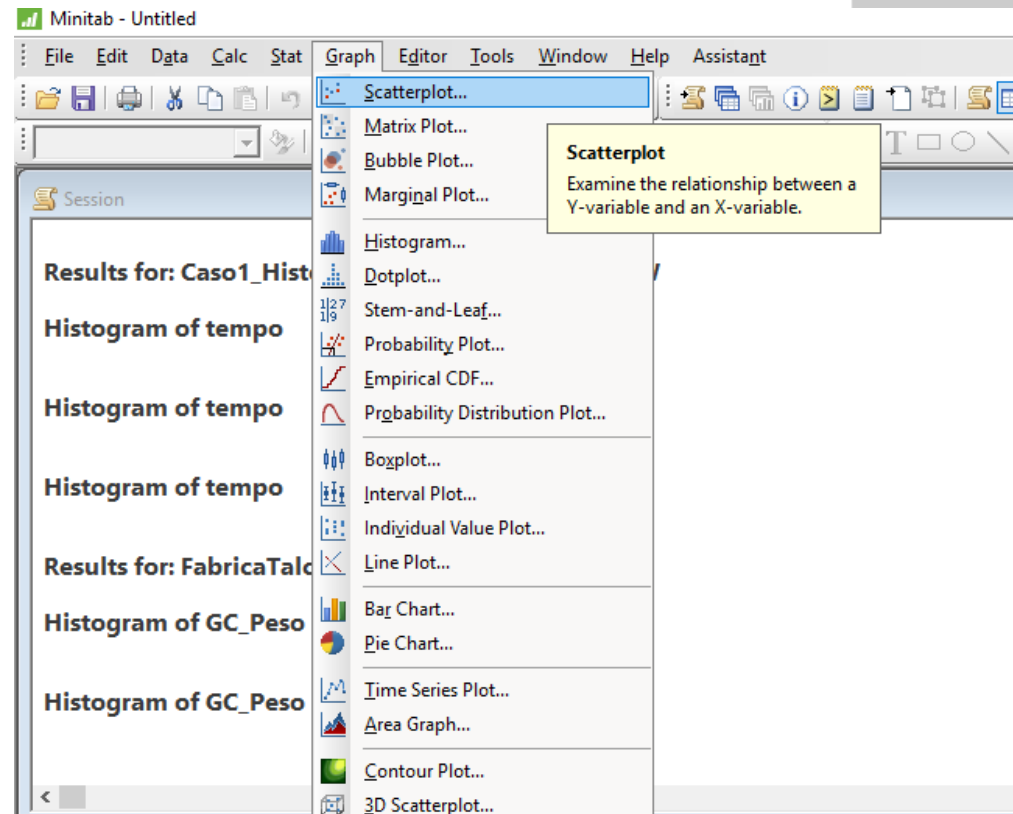
Minitab – Mapa de Análise Estatística (Histograma com subgrupo e ajuste)

- ⇒ Abrir o arquivo: Histograma
- ⇒ Selecionar: Graph > Histogram>With fit and groups
- By variable: selecionar variáveis a serem comparadas



Minitab – Mapa de Análise Estatística (Diagrama de dispersão)

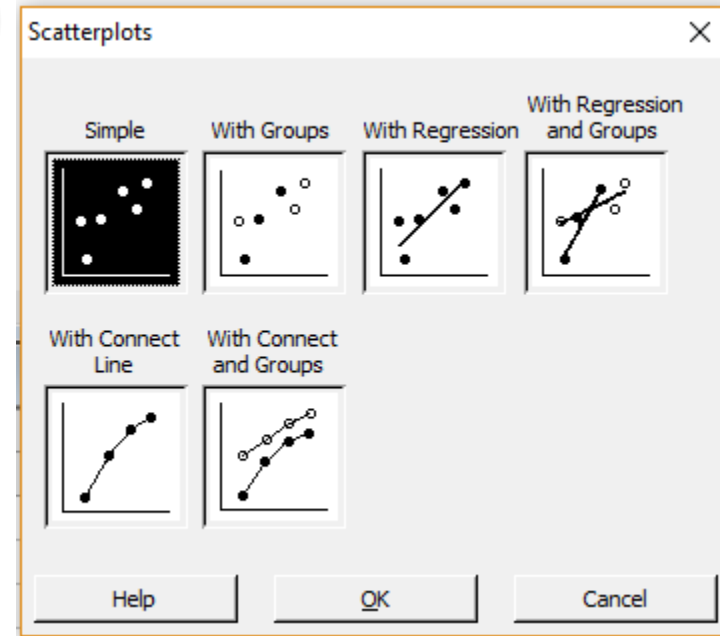
- ⇒ Abrir o arquivo: Diagrama de dispersão
- ⇒ Selecionar: Graph > Scatterplot >



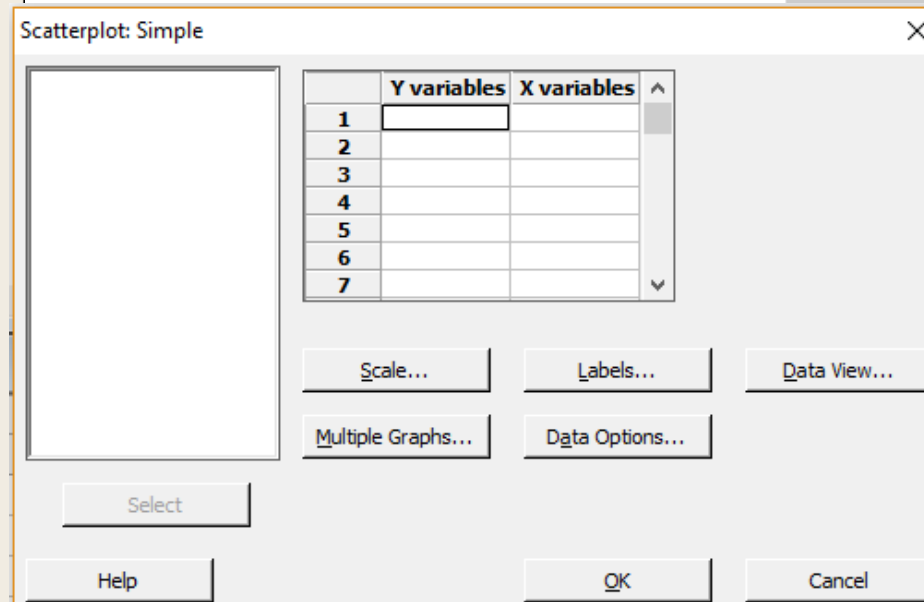
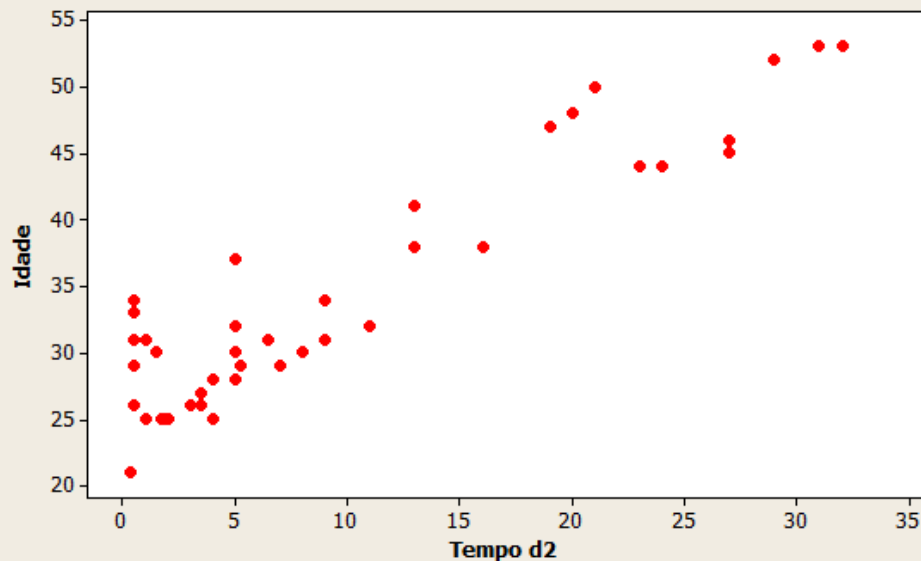


Minitab – Mapa de Análise Estatística (Diagrama de dispersão Simples)

- ⇒ Abrir o arquivo: Diagrama de dispersão
- ⇒ Selecionar: Graph > Scatterplot > Simple > OK
 - “Y variables”: Idade
 - “X variables”: Tempo

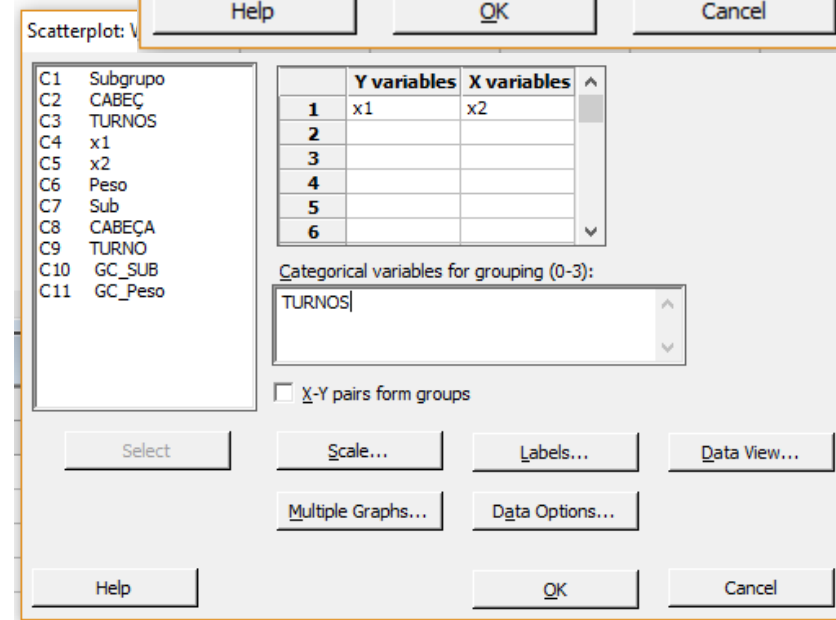
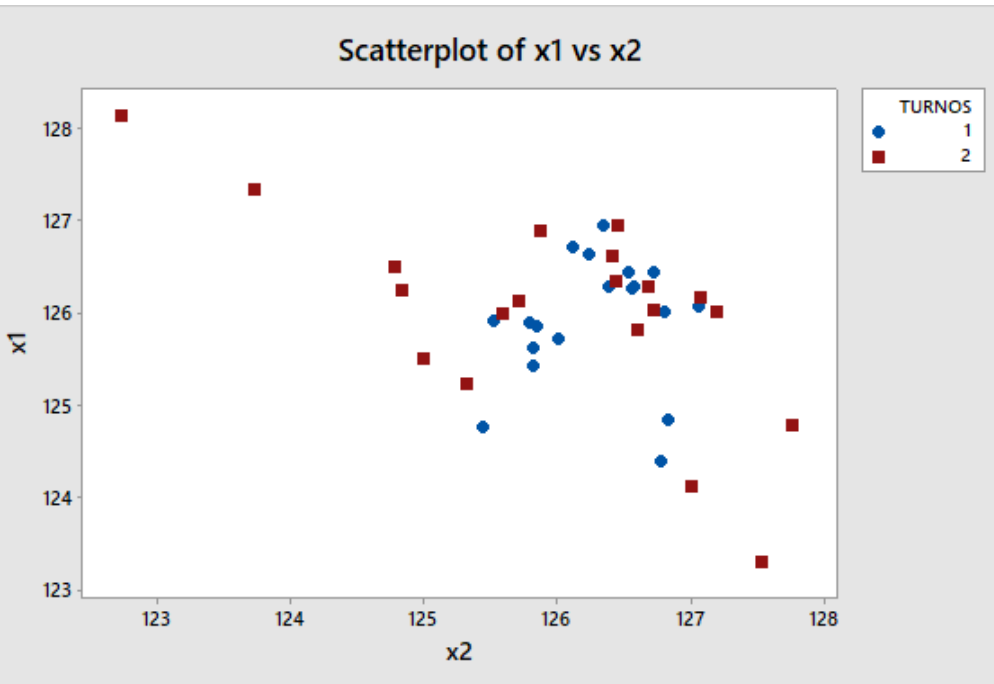
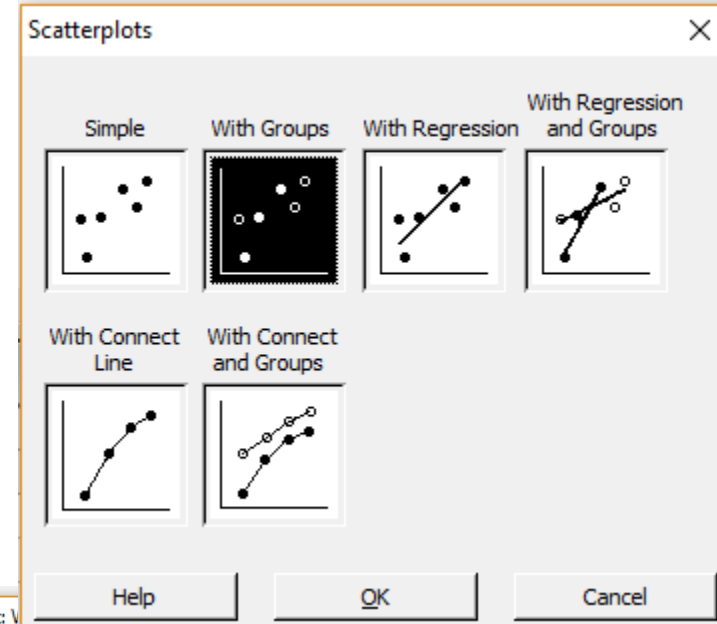


Scatterplot of Idade vs Tempo d2



Minitab – Mapa de Análise Estatística (Diagrama de dispersão com Subgrupo)

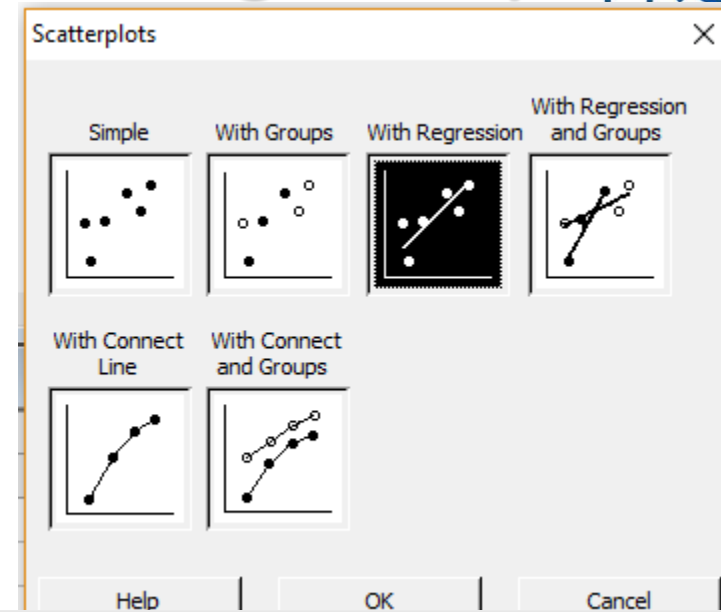
- ⇒ Abrir o arquivo
- ⇒ Selecionar: Graph > Scatterplot > With Groups > OK
 - “Y variables”: x1
 - “X variables”: x2
 - Categórica: Turno



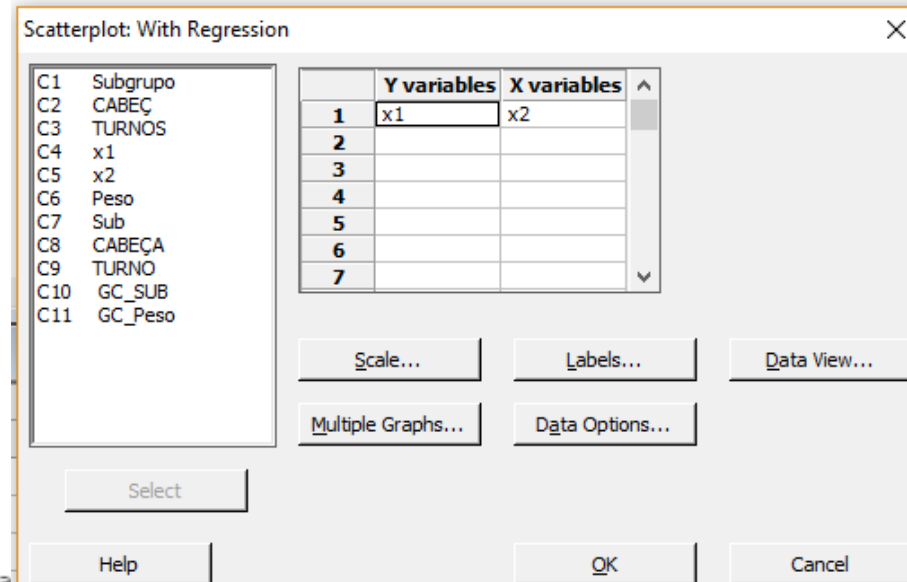
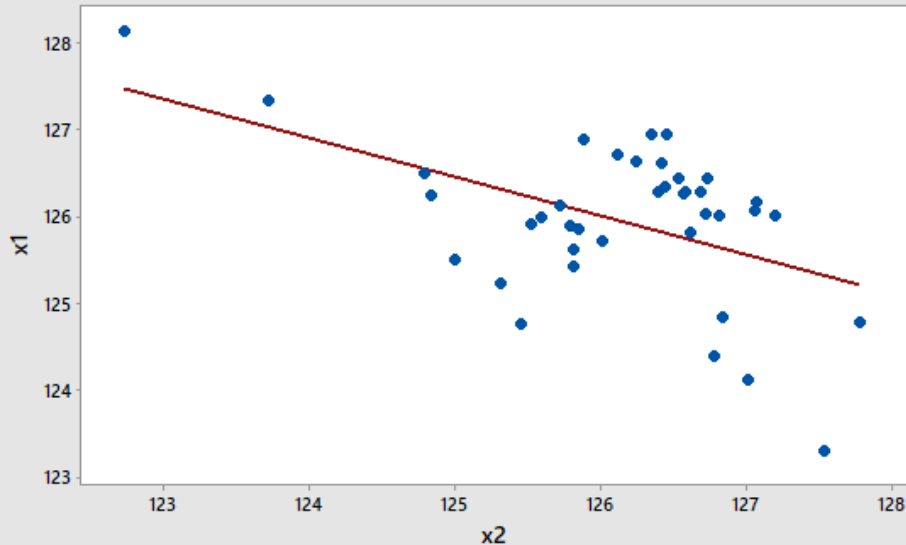
Minitab – Mapa de Análise Estatística (Diagrama de dispersão Simples com regressão)



- ⇒ Abrir o arquivo
- ⇒ Selecionar: Graph > Scatterplot > With Regression > OK
 - “Y variables”: Idade
 - “X variables”: Tempo

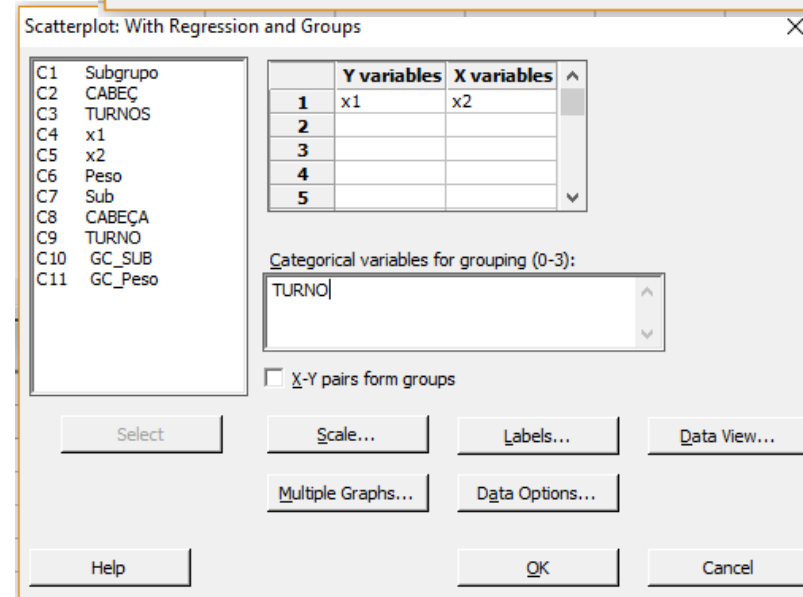
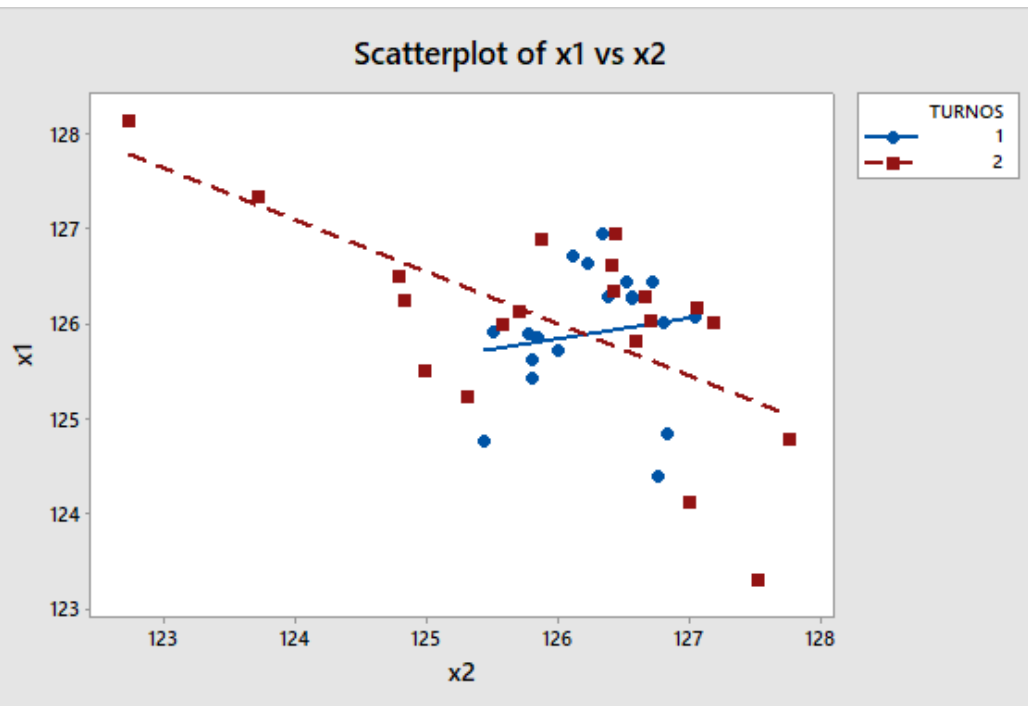
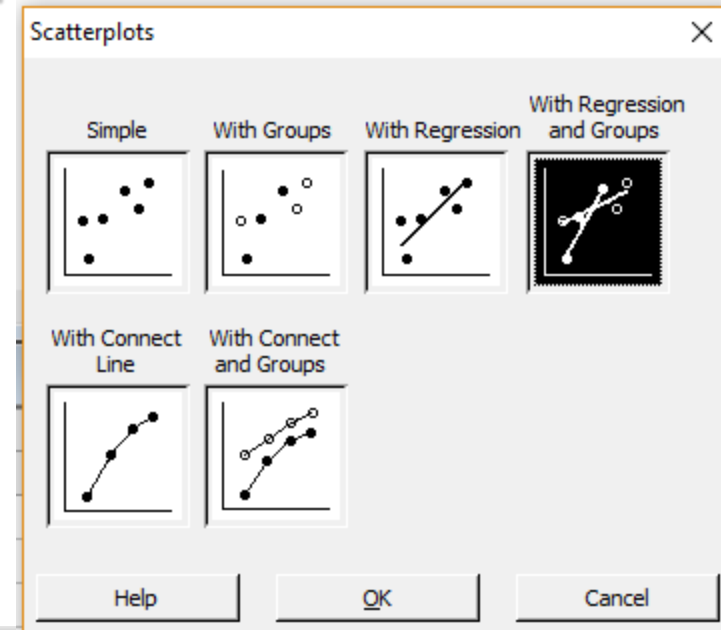


Scatterplot of x1 vs x2



Minitab – Mapa de Análise Estatística (Diagrama de dispersão com subgrupo e regressão)

- ⇒ Abrir o arquivo
- ⇒ Selecionar: Graph > Scatterplot > With Regression and Groups > OK
 - “Y variables”: x1
 - “X variables”: x2



Minitab – Mapa de Análise Estatística (Gráfico de série temporal)



- ⇒ Abrir o arquivo: Série temporal
- ⇒ Selecionar: Graph > Time series plot >

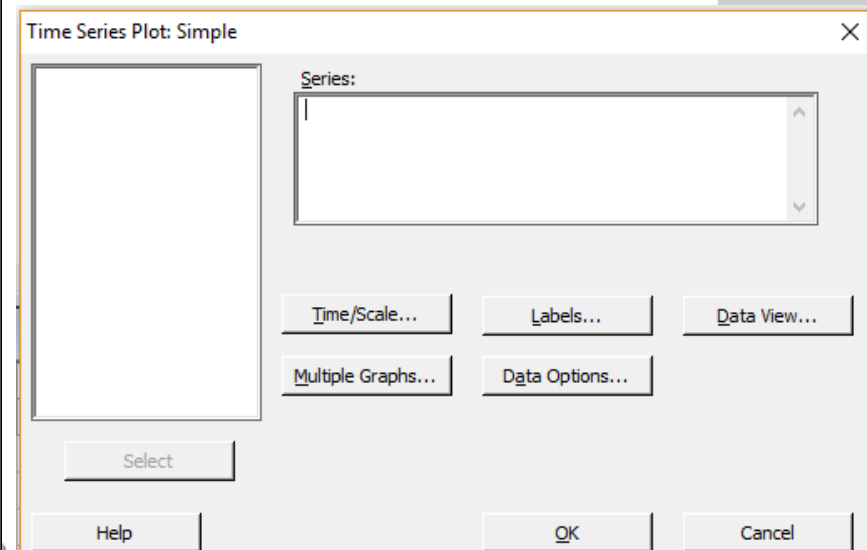
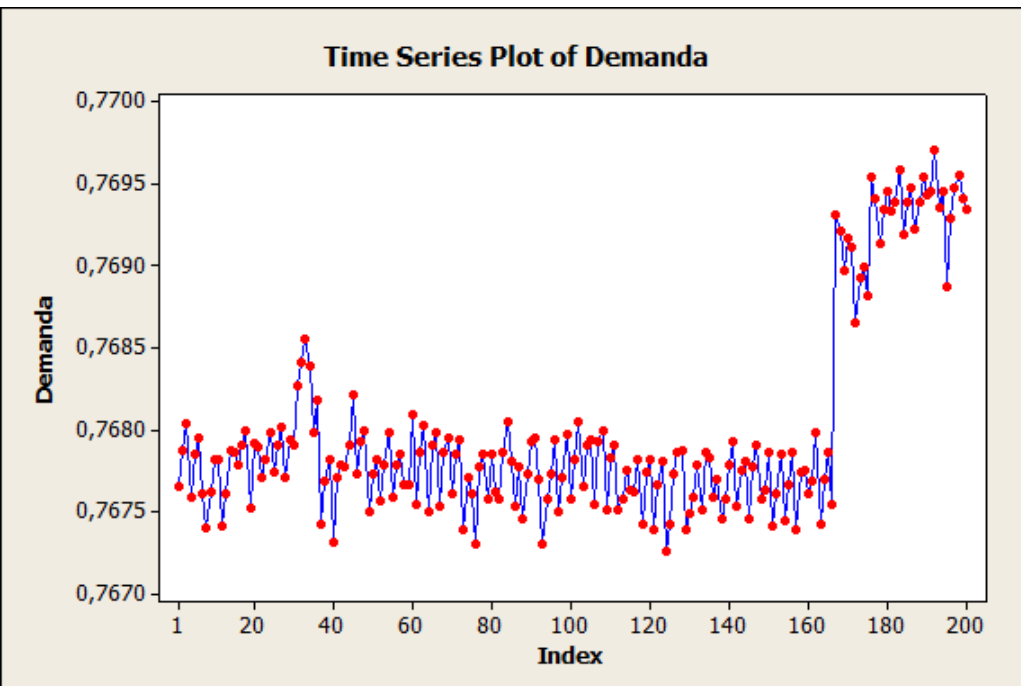
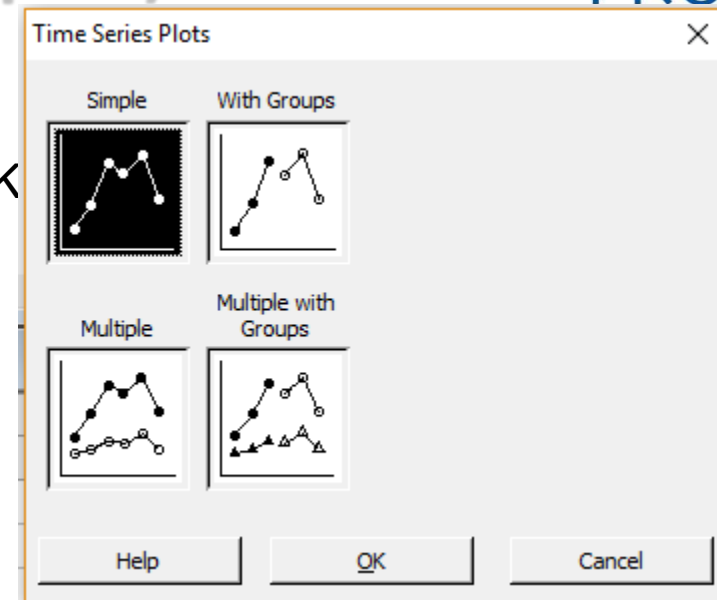
The screenshot shows the Minitab software interface. The 'Graph' menu is open, and 'Time Series Plot...' is highlighted. A tooltip for 'Time Series Plot' is displayed, stating: 'Time Series Plot Plot the data in the order that it appears in the worksheet to determine whether there is a trend or a seasonal pattern.'

Worksheet 8 ***

	C1	C2	C3	C4	C5	C6	C7	C8	C9
1									
2									

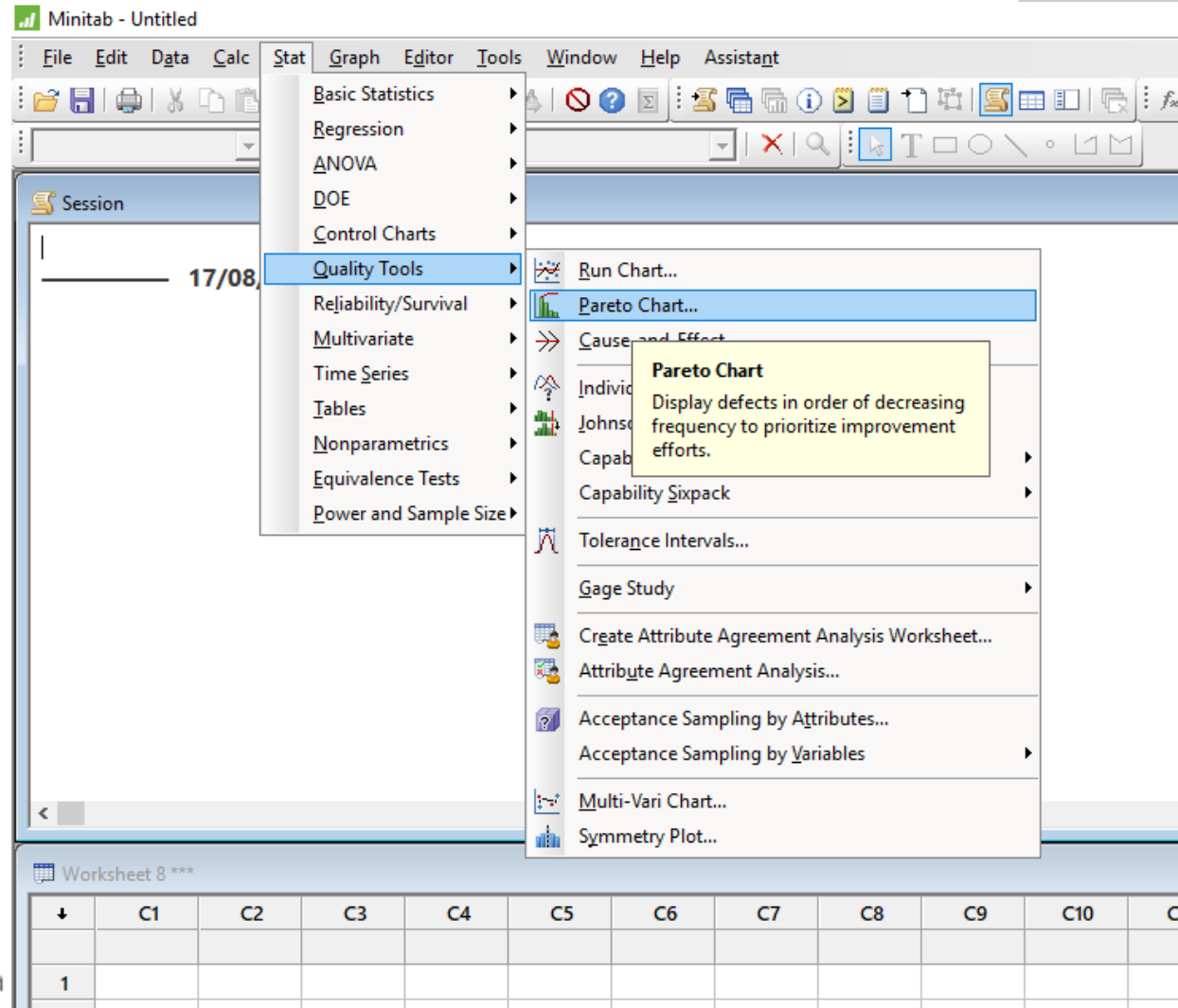
Minitab – Mapa de Análise Estatística (Gráfico de série temporal simples)

- ⇒ Abrir o arquivo: Gráfico de série temporal
- ⇒ Selecionar: Graph > Time series plot > Simple > OK
 - Séries: demanda



Minitab – Mapa de Análise Estatística (Pareto)

- ⇒ Abrir o arquivo Gráfico de Controle
- ⇒ Selecionar: Stat > Quality tools > Pareto >



The screenshot shows the Minitab software interface. The 'Stat' menu is open, and the 'Quality Tools' option is selected. A sub-menu is displayed, showing 'Pareto Chart...' as the selected option. A tooltip for 'Pareto Chart' is visible, stating: 'Pareto Chart Display defects in order of decreasing frequency to prioritize improvement efforts.'

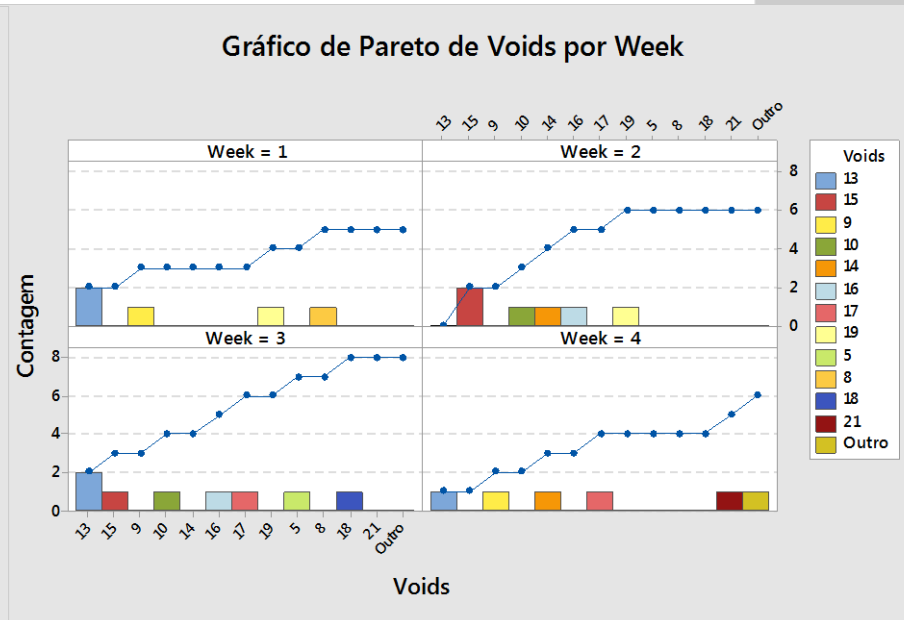
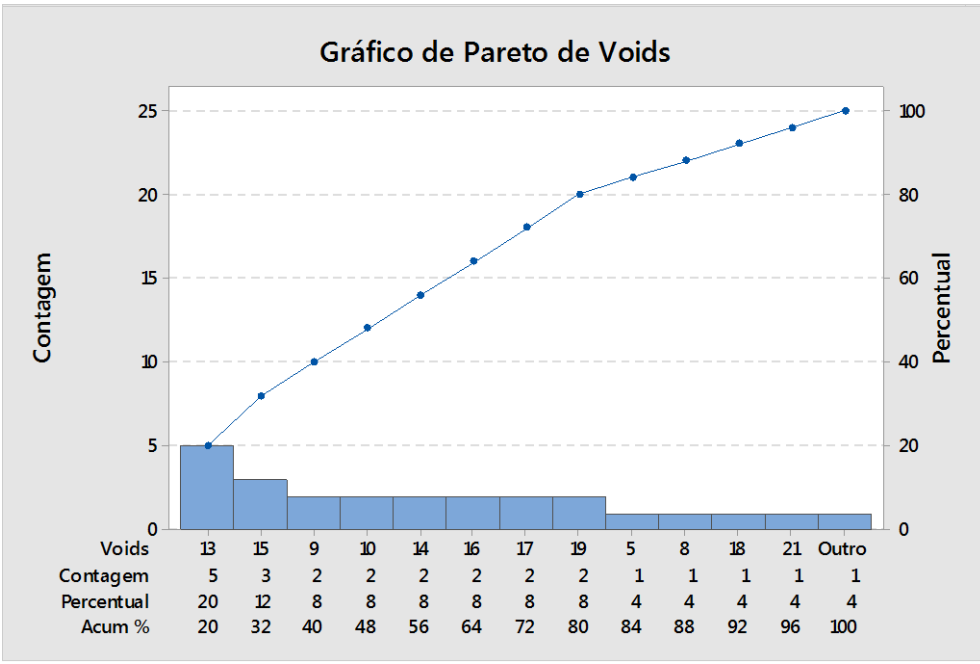
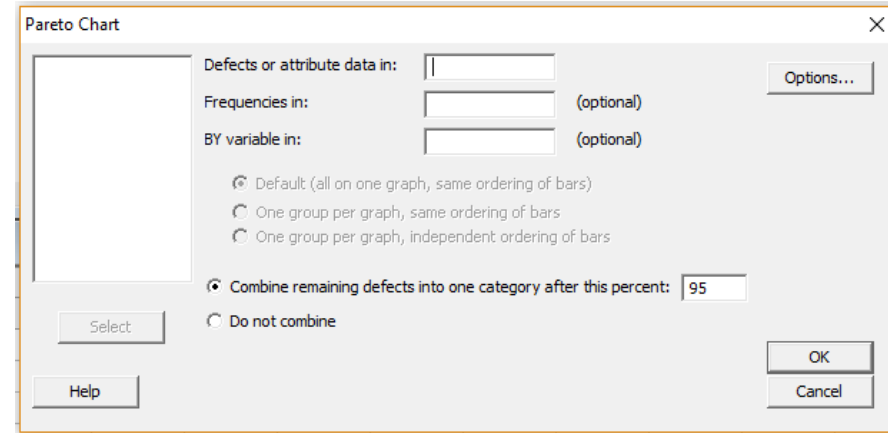
The interface includes a menu bar (File, Edit, Data, Calc, Stat, Graph, Editor, Tools, Window, Help, Assistant), a toolbar, a Session window, and a Worksheet window (Worksheet 8 ***). The Worksheet window shows a grid with columns C1 through C10 and row 1.

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11
1											

Minitab – Mapa de Análise Estatística (Pareto Simples ou com subgrupo)

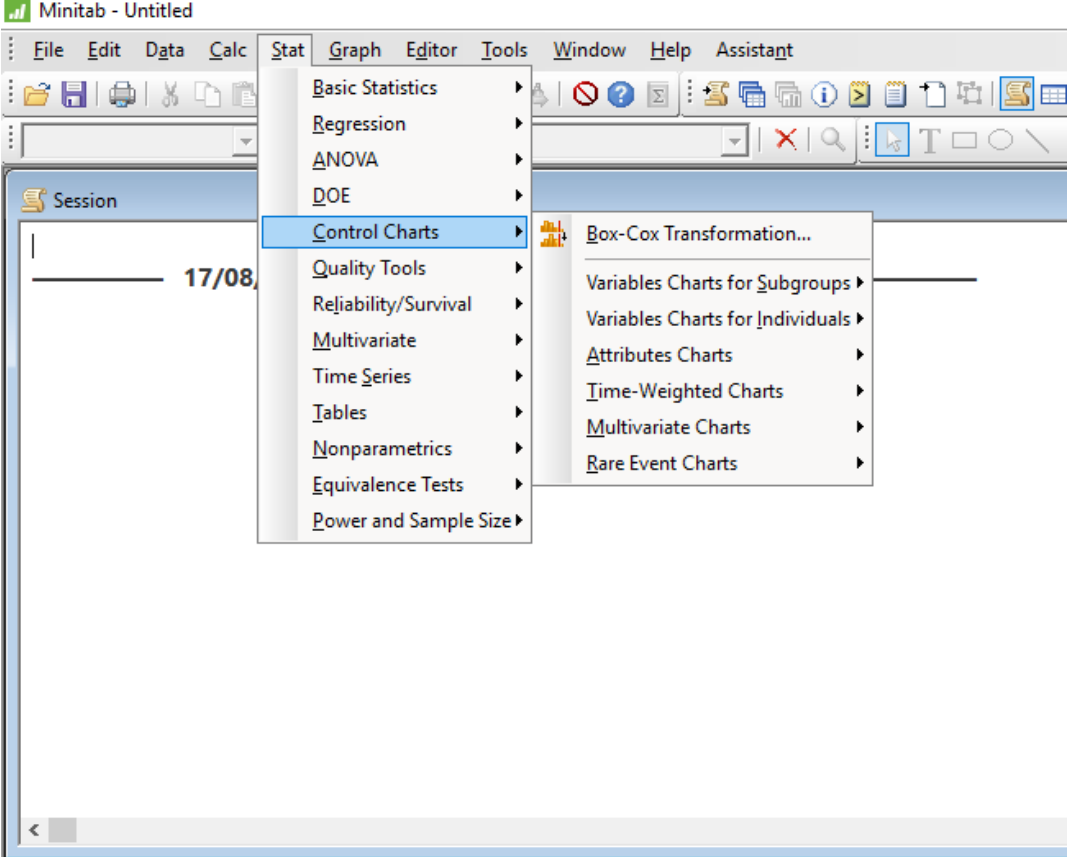


- ⇒ Abrir o arquivo Gráfico de Controle
- ⇒ Selecionar: Stat > Quality tools > Pareto > OK
 - Defects or attribute data in: voids



Minitab – Gráfico de controle

- ⇒ Abrir o arquivo: Gráfico de controle
- ⇒ Selecionar: Stat > Control Charts >

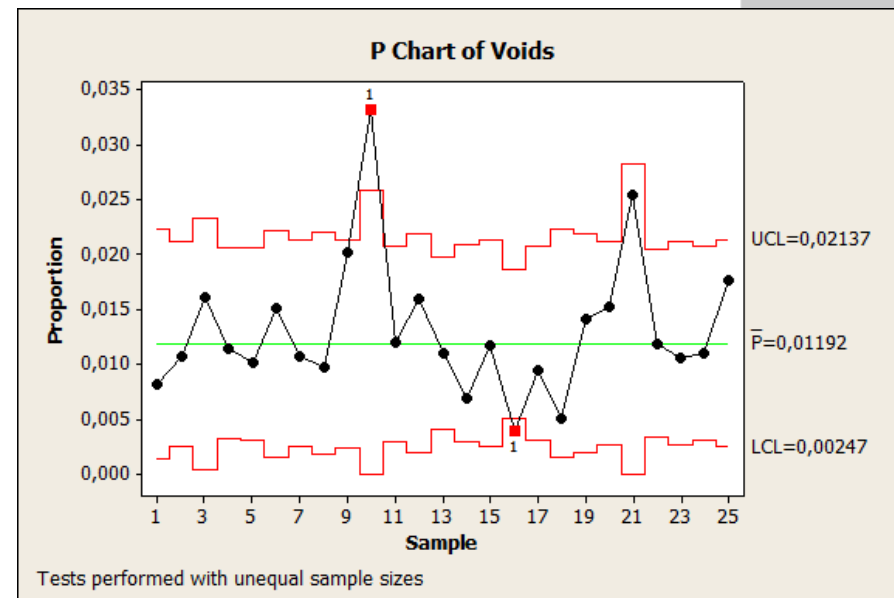
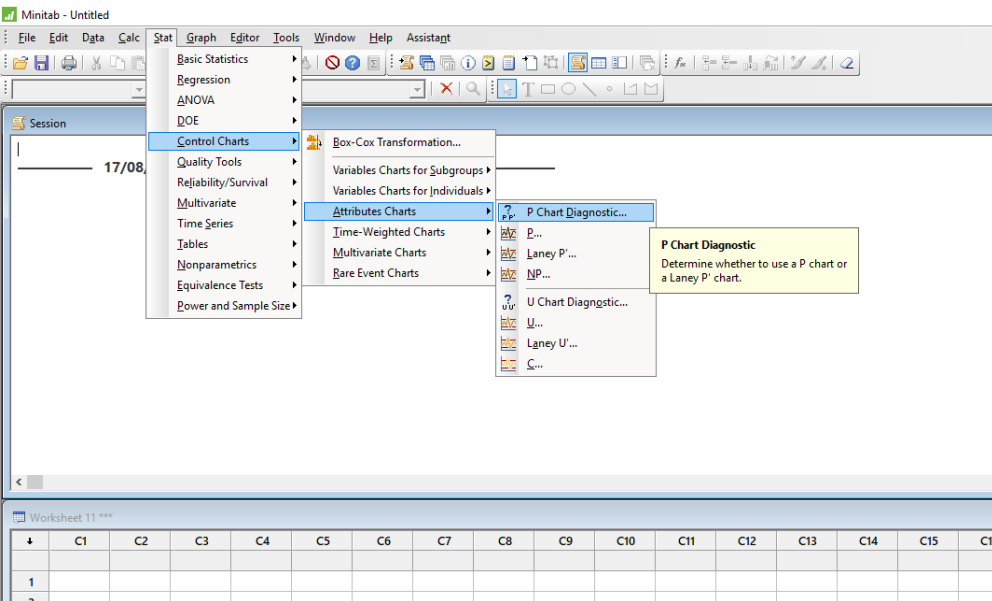


The screenshot shows the Minitab software interface. The 'Stat' menu is open, and the 'Control Charts' option is selected. A sub-menu is displayed, showing 'Variables Charts for Subgroups' as the selected option. The interface includes a menu bar with 'File', 'Edit', 'Data', 'Calc', 'Stat', 'Graph', 'Editor', 'Tools', 'Window', 'Help', and 'Assistant'. The main workspace shows a 'Session' window with the date '17/08'. At the bottom, a 'Worksheet 11 ***' is visible, showing a grid with columns C1 through C9 and row 1.

	C1	C2	C3	C4	C5	C6	C7	C8	C9
1									

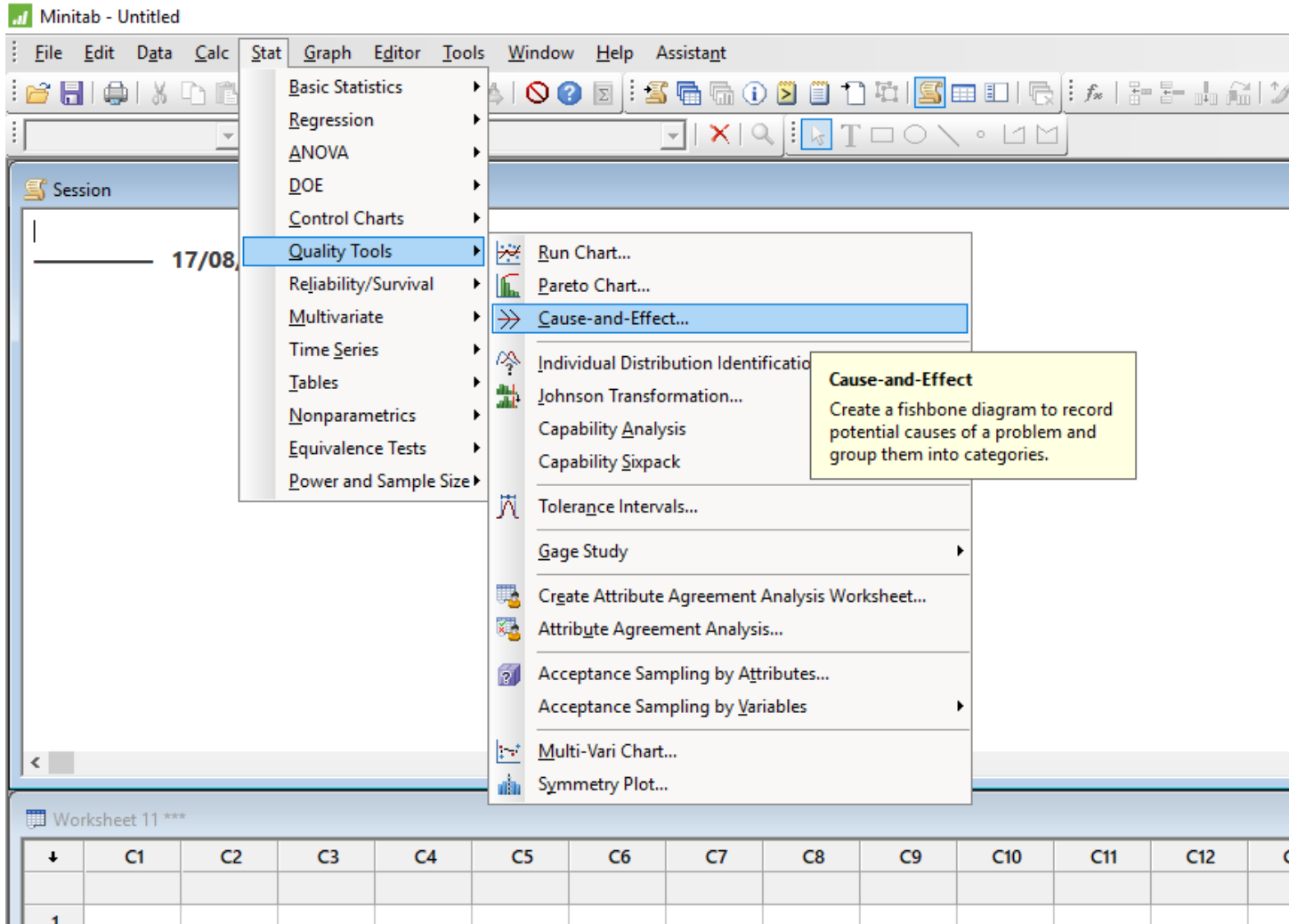
Minitab – Gráfico de controle Atributo

- ⇒ Abrir o arquivo: Gráfico de controle
- ⇒ Selecionar: Stat > Control Charts > Attribute Charts > P
 - Variables: voids
 - Subgroup size: subgrp



Minitab – Espinha de Peixe

Opção: Quality Tools/Cause-and-Effect ...



The screenshot displays the Minitab software interface. The 'Stat' menu is open, and the 'Quality Tools' option is selected. A sub-menu is visible, showing 'Cause-and-Effect...' as the chosen option. A yellow tooltip box provides a description: 'Cause-and-Effect: Create a fishbone diagram to record potential causes of a problem and group them into categories.'

Minitab - Untitled

File Edit Data Calc Stat Graph Editor Tools Window Help Assistant

Basic Statistics
Regression
ANOVA
DOE
Control Charts
Quality Tools
Reliability/Survival
Multivariate
Time Series
Tables
Nonparametrics
Equivalence Tests
Power and Sample Size

Run Chart...
Pareto Chart...
Cause-and-Effect...
Individual Distribution Identification
Johnson Transformation...
Capability Analysis
Capability Sixpack
Tolerance Intervals...
Gage Study
Create Attribute Agreement Analysis Worksheet...
Attribute Agreement Analysis...
Acceptance Sampling by Attributes...
Acceptance Sampling by Variables
Multi-Vari Chart...
Symmetry Plot...

Cause-and-Effect
Create a fishbone diagram to record potential causes of a problem and group them into categories.

Session

17/08

Worksheet 11 ***

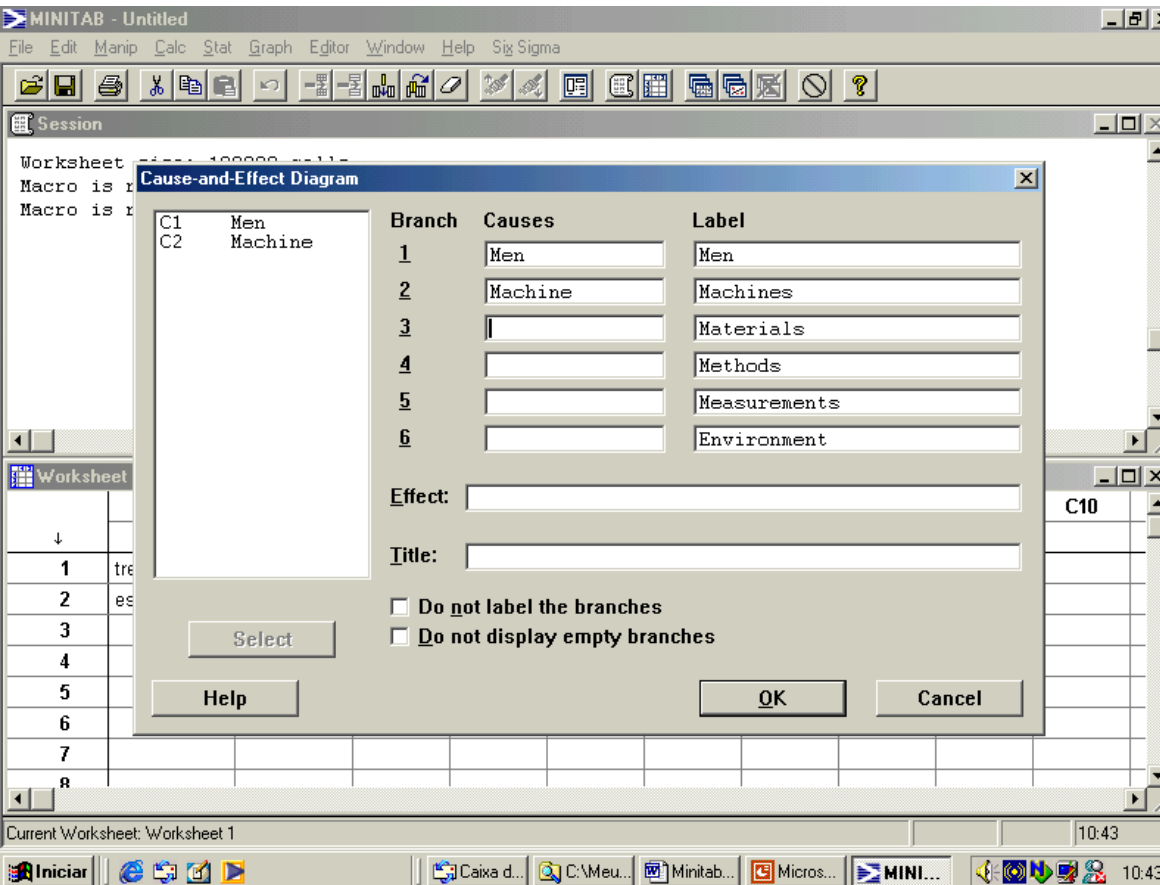
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13
1													

Minitab – Espinha de Peixe

Opção: Quality Tools/Cause-and-Effect ...

Deve entrar com o conjunto de dado que se deseja analisar

Exemplo “Produção Semanal”



The screenshot shows the Minitab software interface with the 'Cause-and-Effect Diagram' dialog box open. The dialog box contains a list of causes and their corresponding labels, along with options for labeling and displaying empty branches.

Branch	Causes	Label
1	Men	Men
2	Machine	Machines
3		Materials
4		Methods
5		Measurements
6		Environment

Effect:

Title:

Do not label the branches

Do not display empty branches

Buttons: Select, Help, OK, Cancel