

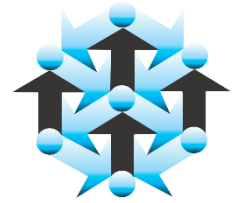


EESC · USP

Escola de Engenharia de São Carlos
Universidade de São Paulo

USP

Universidade de São Paulo



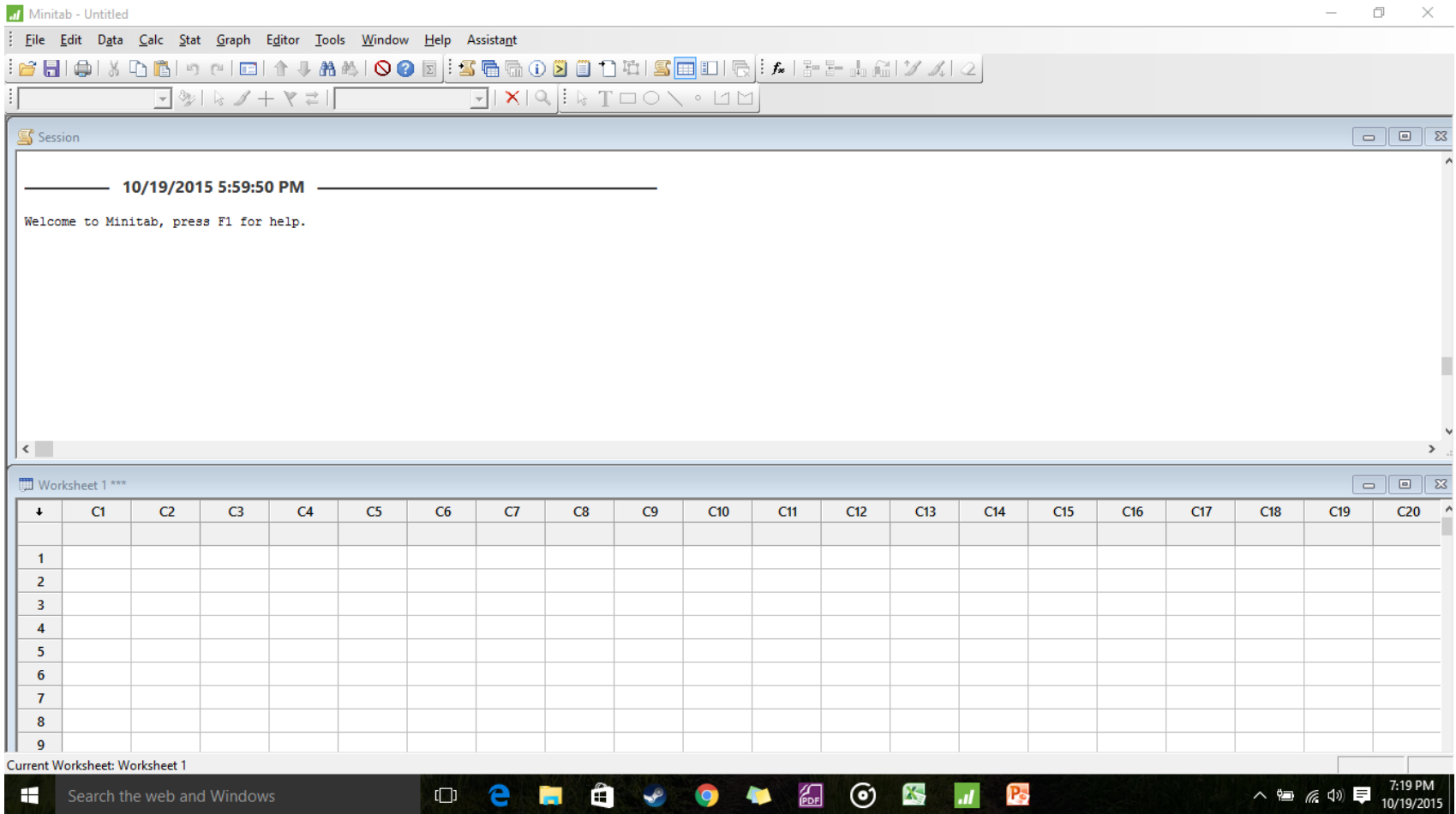
Departamento de
Engenharia de Produção

Tutorial Minitab

Controle Estatístico de Processos

SEP 0280 – Qualidade Aplicada à Manufatura
Prof. Mateus Gerolamo

Abrindo o Minitab



Importando os dados

The screenshot displays the Minitab software interface. The top window, titled 'Session', shows a timestamp of 10/20/2015 2:58:46 PM and a welcome message: 'Welcome to Minitab, press F1 for help.' Below this, the 'Worksheet 1 ***' window is visible, containing a data table with 20 columns (C1 to C20) and 9 rows of numerical data.

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20
1	998.8	994.9	1001.0	1005.1	1004.8	1006.9	991.3	999.1	1004.4	995.7										
2	997.2	993.2	992.6	996.1	996.9	991.5	997.7	998.4	1000.5	998.5										
3	998.7	998.5	1005.4	999.7	999.3	997.9	1007.9	1003.5	1009.5	997.4										
4	1006.6	993.6	1002.2	1003.6	1007.7	999.7	997.9	1002.7	998.5	1003.0										
5	994.2	996.6	993.9	998.5	999.9	1000.1	998.7	1008.8	993.0	997.1										
6	989.7	1005.8	994.9	997.4	1003.0	1001.9	1003.5	1002.4	994.5	995.5										
7	1002.8	1001.3	996.2	999.0	1000.5	1002.2	1000.6	996.4	1007.5	1001.9										
8	1000.3	1003.3	1003.4	997.5	996.3	1004.4	995.2	993.8	1002.8	1002.6										
9	1008.8	1005.8	1005.2	1000.5	1000.0	1001.8	999.9	995.8	992.9	1003.3										

Combinando os Dados

The screenshot shows the Minitab software interface. The 'Data' menu is open, and the 'Stack' option is selected. A tooltip for 'Stack Rows' is visible, stating: 'Stack Rows: Copy data originally entered across rows into one column.' The main window displays a data table with columns C4 through C20 and rows 1 through 9.

	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20
1	998.8	994.9	1001.0	1005.1	1004.8	1006.9	991.3	999.1	1004.4	995.7							
2	997.2	993.2	992.6	996.1	996.9	991.5	997.7	998.4	1000.5	998.5							
3	998.7	998.5	1005.4	999.7	999.3	997.9	1007.9	1003.5	1009.5	997.4							
4	1006.6	993.6	1002.2	1003.6	1007.7	999.7	997.9	1002.7	998.5	1003.0							
5	994.2	996.6	993.9	998.5	999.9	1000.1	998.7	1008.8	993.0	997.1							
6	989.7	1005.8	994.9	997.4	1003.0	1001.9	1003.5	1002.4	994.5	995.5							
7	1002.8	1001.3	996.2	999.0	1000.5	1002.2	1000.6	996.4	1007.5	1001.9							
8	1000.3	1003.3	1003.4	997.5	996.3	1004.4	995.2	993.8	1002.8	1002.6							
9	1008.8	1005.8	1005.2	1000.5	1000.0	1001.8	999.9	995.8	992.9	1003.3							

Combinando os Dados

The screenshot displays the Minitab software interface. A 'Stack Rows' dialog box is open, allowing the user to combine data from multiple columns into a single column. The dialog is configured as follows:

- Rows to be stacked are in the following columns:** C1-C10
- Store stacked data in:** C15
- Store row subscripts in:
- Store column subscripts in:
- Expand the following columns while stacking rows:

The background shows a worksheet with data in columns C1 through C6 and C14 through C20. The data in columns C1-C6 is as follows:

	C1	C2	C3	C4	C5	C6
1	998.8	994.9	1001.0	1005.1	1004.8	1006.9
2	997.2	993.2	992.6	996.1	996.9	991.5
3	998.7	998.5	1005.4	999.7	999.3	997.9
4	1006.6	993.6	1002.2	1003.6	1007.7	999.7
5	994.2	996.6	993.9	998.5	999.9	1000.1
6	989.7	1005.8	994.9	997.4	1003.0	1001.9
7	1002.8	1001.3	996.2	999.0	1000.5	1002.2
8	1000.3	1003.3	1003.4	997.5	996.3	1004.4
9	1008.8	1005.8	1005.2	1000.5	1000.0	1001.8

Dados combinados

Minitab - Untitled - [Worksheet 1 ***]

File Edit Data Calc Stat Graph Editor Tools Window Help Assistant

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20
1	998.8	994.9	1001.0	1005.1	1004.8	1006.9	991.3	999.1	1004.4	995.7					998.8					
2	997.2	993.2	992.6	996.1	996.9	991.5	997.7	998.4	1000.5	998.5					994.9					
3	998.7	998.5	1005.4	999.7	999.3	997.9	1007.9	1003.5	1009.5	997.4					1001.0					
4	1006.6	993.6	1002.2	1003.6	1007.7	999.7	997.9	1002.7	998.5	1003.0					1005.1					
5	994.2	996.6	993.9	998.5	999.9	1000.1	998.7	1008.8	993.0	997.1					1004.8					
6	989.7	1005.8	994.9	997.4	1003.0	1001.9	1003.5	1002.4	994.5	995.5					1006.9					
7	1002.8	1001.3	996.2	999.0	1000.5	1002.2	1000.6	996.4	1007.5	1001.9					991.3					
8	1000.3	1003.3	1003.4	997.5	996.3	1004.4	995.2	993.8	1002.8	1002.6					999.1					
9	1008.8	1005.8	1005.2	1000.5	1000.0	1001.8	999.9	995.8	992.9	1003.3					1004.4					
10	1001.8	1002.5	1000.9	995.9	1005.0	998.8	996.6	996.7	998.3	998.2					995.7					
11															997.2					
12															993.2					
13															992.6					
14															996.1					
15															996.9					
16															991.5					
17															997.7					
18															998.4					
19															1000.5					
20															998.5					
21															998.7					
22															998.5					
23															1005.4					
24															999.7					
25															999.7					

Current Worksheet: Worksheet 1

Search the web and Windows

2:59 PM 10/20/2015

Estatística Descritiva

Minitab - Untitled - [Worksheet 1 ***]

File Edit Data Calc Stat Graph Editor Tools Window Help Assistant

Basic Statistics

- Display Descriptive Statistics...
- Regression
 - Store Descriptive Statistics...
 - Graphical Summary...
- ANOVA
- DOE
- Control Charts
- Quality Tools
- Reliability/Survival
- Multivariate
- Time Series
- Tables
- Nonparametrics
- Equivalence Tests
- Power and Sample Size
- 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 Poisson...

Display Descriptive Statistics
Summarize your data with descriptive statistics, such as the mean and the standard deviation, and display the results in the Session window.

	C1	C2	C12	C13	C14	C15	C16	C17	C18	C19	C20
1	998.8	994.9				998.8					
2	997.2	993.2				994.9					
3	998.7	998.5				1001.0					
4	1006.6	993.6				1005.1					
5	994.2	996.6				1004.8					
6	989.7	1005.8				1006.9					
7	1002.8	1001.3				991.3					
8	1000.3	1003.3				999.1					
9	1008.8	1005.8	1005.2	1000.5	10	1004.4					
10	1001.8	1002.5	1000.9	995.9	10	995.7					
11						997.2					
12						993.2					
13						992.6					
14						996.1					
15						996.9					
16						991.5					
17						997.7					
18						998.4					
19						1000.5					
20						998.5					
21						998.7					
22						998.5					
23						1005.4					

Escolhendo o que calcular

The screenshot shows the Minitab software interface. The main window displays a worksheet with columns C1 through C20 and rows 1 through 25. The data in the first 10 columns is as follows:

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
1	998.8	994.9	1001.0	1005.1	1004.8	1006.9	991.3	999.1	1004.4	995.7
2	997.2	993.2	992.6	996.1	996.9	991.5	997.7	998.4	1000.5	998.5
3	998.7	998.7	998.7	998.7	998.7	998.7	998.7	998.7	998.7	998.7
4	1006.6	1006.6	1006.6	1006.6	1006.6	1006.6	1006.6	1006.6	1006.6	1006.6
5	994.2	994.2	994.2	994.2	994.2	994.2	994.2	994.2	994.2	994.2
6	989.7	989.7	989.7	989.7	989.7	989.7	989.7	989.7	989.7	989.7
7	1002.8	1002.8	1002.8	1002.8	1002.8	1002.8	1002.8	1002.8	1002.8	1002.8
8	1000.3	1000.3	1000.3	1000.3	1000.3	1000.3	1000.3	1000.3	1000.3	1000.3
9	1008.8	1008.8	1008.8	1008.8	1008.8	1008.8	1008.8	1008.8	1008.8	1008.8
10	1001.8	1001.8	1001.8	1001.8	1001.8	1001.8	1001.8	1001.8	1001.8	1001.8

Two dialog boxes are open over the worksheet:

- Display Descriptive Statistics:** This dialog box has a "Variables:" list containing C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, and C20. The "By variables (optional):" list is empty. Buttons for "Select", "Statistics...", "Graphs...", "Help", "OK", and "Cancel" are visible.
- Display Descriptive Statistics: Statistics:** This dialog box allows selecting specific statistics to calculate. The following statistics are checked: Mean, Standard deviation, Variance, First quartile, Median, Third quartile, and Range. Other options include Trimmed mean, SE of mean, Sum, Minimum, Maximum, Coefficient of variation, Sum of squares, Skewness, Kurtosis, MSSD, N nonmissing, N missing, N total, Cumulative N, Percent, Cumulative percent, and Check statistics (Default, None, All). Buttons for "Help", "OK", and "Cancel" are visible.

Resultados

10/20/2015 2:58:46 PM

Welcome to Minitab, press F1 for help.

Descriptive Statistics: C15

Variable	Mean	StDev	Variance	Minimum	Q1	Median	Q3	Maximum	Range
C15	999.84	4.34	18.85	989.70	996.63	999.70	1002.95	1009.50	19.80

Current Worksheet: Worksheet 1

3:07 PM
10/20/2015

Histograma

Histogram
Examine the shape and spread of your data by using bars to show the frequency of data within each interval. Works best with moderate to large samples ($n > 20$).

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20
1	998.8	994.9					996.9	991.3	999.1	1004.4	995.7				998.8					
2	997.2	993.2					991.5	997.7	998.4	1000.5	998.5				994.9					
3	998.7	998.5					997.9	1007.9	1003.5	1009.5	997.4				1001.0					
4	1006.6	993.6					997.7	997.9	1002.7	998.5	1003.0				1005.1					
5	994.2	996.6	993.9	998.5	999.9	1000.1	998.7	1008.8	993.0	997.1					1004.8					
6	989.7	1005.8	994.9	997.4	1003.0	1001.9	1003.5	1002.4	994.5	995.5					1006.9					
7	1002.8	1001.3	996.2	999.0	1000.5	1002.2	1000.6	996.4	1007.5	1001.9					991.3					
8	1000.3	1003.3	1003.4	997.5	996.3	1004.4	995.2	993.8	1002.8	1002.6					999.1					
9	1008.8	1005.8	1005.2	1000.5	1000.0	1001.8	999.9	995.8	992.9	1003.3					1004.4					

Tipo do Histograma

The screenshot shows the Minitab software interface. At the top, there is a menu bar (File, Edit, Data, Calc, Stat, Graph, Editor, Tools, Window, Help, Assistant) and a toolbar. The main window displays a session log with the date and time '10/20/2015 2:58:46 PM' and a 'Descriptive Statistics: C15' table. A 'Histograms' dialog box is open in the center, showing four options: 'Simple', 'With Fit', 'With Groups', and 'With Fit and Groups'. Below the dialog box, a portion of a data table is visible, showing columns C1 through C20 and rows 1 through 9. A Windows taskbar is visible at the bottom, including the Start button, search bar, and various application icons. A WhatsApp chat window is also visible in the bottom right corner.

Variable	Mean	StDev	Variance	Minimum	Q1	Median	Q3
C15	999.84	4.34	18.85	989.70	996.63	999.70	1002.95

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20
1	998.8	994.9	1001.0	1005.1	1004.8	1006.9	991.3								998.8					
2	997.2	993.2	992.6	996.1	996.9	991.5	997.7								994.9					
3	998.7	998.5	1005.4	999.7	999.3	997.9	1007.9	1003.5	1009.5	997.4					1001.0					
4	1006.6	993.6	1002.2	1003.6	1007.7	999.7	997.9	1002.7	998.5	1003.0					1005.1					
5	994.2	996.6	993.9	998.5	999.9	1000.1	998.7	1008.8	993.0	997.1					1004.8					
6	989.7	1005.8	994.9	997.4	1003.0	1001.9	1003.5	1002.4	994.5	995.5					1006.9					
7	1002.8	1001.3	996.2	999.0	1000.5	1002.2	1000.6	996.4	1007.5	1001.9					991.3					
8	1000.3	1003.3	1003.4	997.5	996.3	1004.4	995.2	993.8	1002.8	1002.6					999.1					
9	1008.8	1005.8	1005.2	1000.5	1000.0	1001.8	999.9	995.8	992.9	1003.3					1004.4					

Escolha da Variável

Minitab - Untitled

File Edit Data Calc Stat Graph Editor Tools Window Help Assistant

Session

10/20/2015 2:58:46 PM

Welcome to Minitab, press F1 for help.

Descriptive Statistics: C15

Variable	Mean	StDev	Variance	Minimum	Q1	Median
C15	999.84	4.34	18.85	989.70	996.63	999.70

Worksheet 1 ***

	C1	C2	C3	C4	C5	C6	C15	C16	C17	C18	C19	C20
1	998.8	994.9	1001.0	1005.1	1004.8	1006.9	998.8					
2	997.2	993.2	992.6	996.1	996.9	991.9	994.9					
3	998.7	998.5	1005.4	999.7	999.3	997.9	1001.0					
4	1006.6	993.6	1002.2	1003.6	1007.7	999.7	1005.1					
5	994.2	996.6	993.9	998.5	999.9	1000.1	1004.8					
6	989.7	1005.8	994.9	997.4	1003.0	1001.9	1006.9					
7	1002.8	1001.3	996.2	999.0	1000.5	1002.2	991.3					
8	1000.3	1003.3	1003.4	997.5	996.3	1004.4	999.1					
9	1008.8	1005.8	1005.2	1000.5	1000.0	1001.8	1004.4					

Histogram: With Fit

Graph variables:
C15

Scale... Labels... Data View...
Multiple Graphs... Data Options...

Select
Help OK Cancel

Current Worksheet: Worksheet 1

Search the web and Windows

3:14 PM 10/20/2015

Resultado

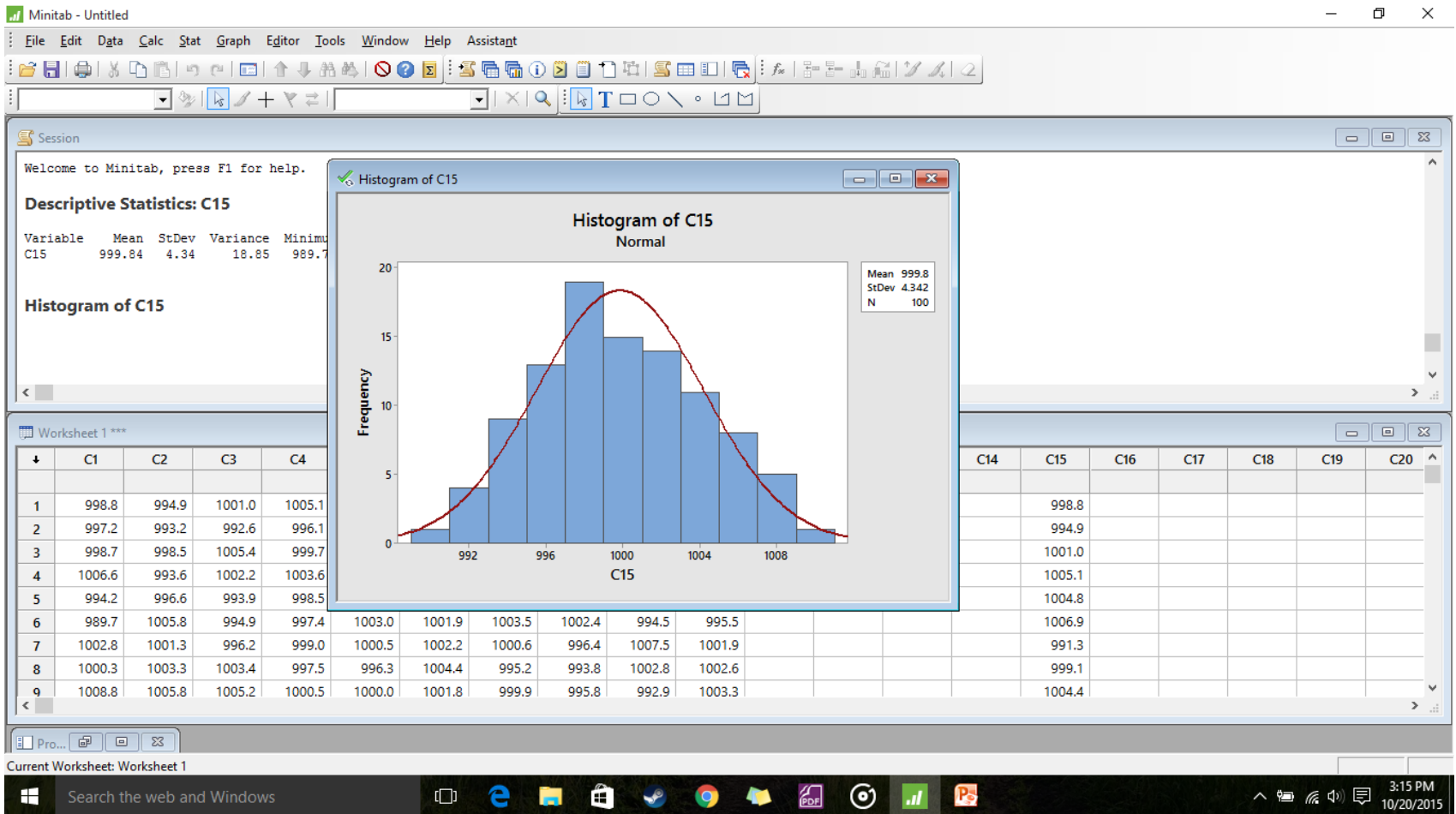


Gráfico de Controle – X barra

The screenshot shows the Minitab software interface. The 'Stat' menu is open, and the path 'Control Charts' > 'Variables Charts for Subgroups' > 'Xbar...' is selected. A tooltip for 'Xbar' is visible, stating: 'Xbar Monitor the mean of your process when you have continuous data in subgroups.'

The data table below shows the following values:

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20
1	1001.7	1004.0	1004.8	996.3	1004.3															
2	999.7	1000.3	1003.2	993.9	998.9															
3	990.9	1004.0	1003.0	1004.0	1002.0															
4	1000.7	1007.3	998.1	995.5	994.9															
5	1000.7	998.3	998.9	997.8	1001.9															
6	998.6	993.7	1002.8	995.5	994.1															
7	1002.7	1010.5	990.5	992.5	1003.0															
8	1000.4	1004.0	1003.0	999.8	997.2															
9	999.9	1005.6	996.1	1005.5	998.1															

Definindo Parâmetros

The screenshot displays the Minitab software interface. In the background, a worksheet titled 'Worksheet 1 ***' contains data columns C1 through C20. The data for columns C1 through C5 is as follows:

	C1	C2	C3	C4	C5
1	1001.7	1000.0	1000.0	1000.0	1000.0
2	999.7	1000.0	1000.0	1000.0	1000.0
3	990.9	1004.0	1003.0	1004.0	1002.0
4	1000.7	1007.3	998.1	995.5	994.9
5	1000.7	998.3	998.9	997.8	1001.9
6	998.6	993.7	1002.8	995.5	994.1
7	1002.7	1010.5	990.5	992.5	1003.0
8	1000.4	1004.0	1003.0	999.8	997.2
9	999.9	1005.6	996.1	1005.5	998.1

Two dialog boxes are open in the foreground. The 'Xbar Chart' dialog is on the left, with 'C1-C5' selected in the 'Observations for a subgroup are in one row of columns:' list. The 'Xbar Chart: Options' dialog is on the right, with the 'Limits' tab selected. The 'Limits' tab contains the following settings:

- Display additional σ limits at: These multiples of the standard deviation: []
- Place bounds on control limits:
 - Lower standard deviation limit bound: 994
 - Upper standard deviation limit bound: 1006
- When subgroup sizes are unequal, calculate control limits:
 - Using actual sizes of the subgroups
 - Assuming all subgroups have size: 2

Resultados

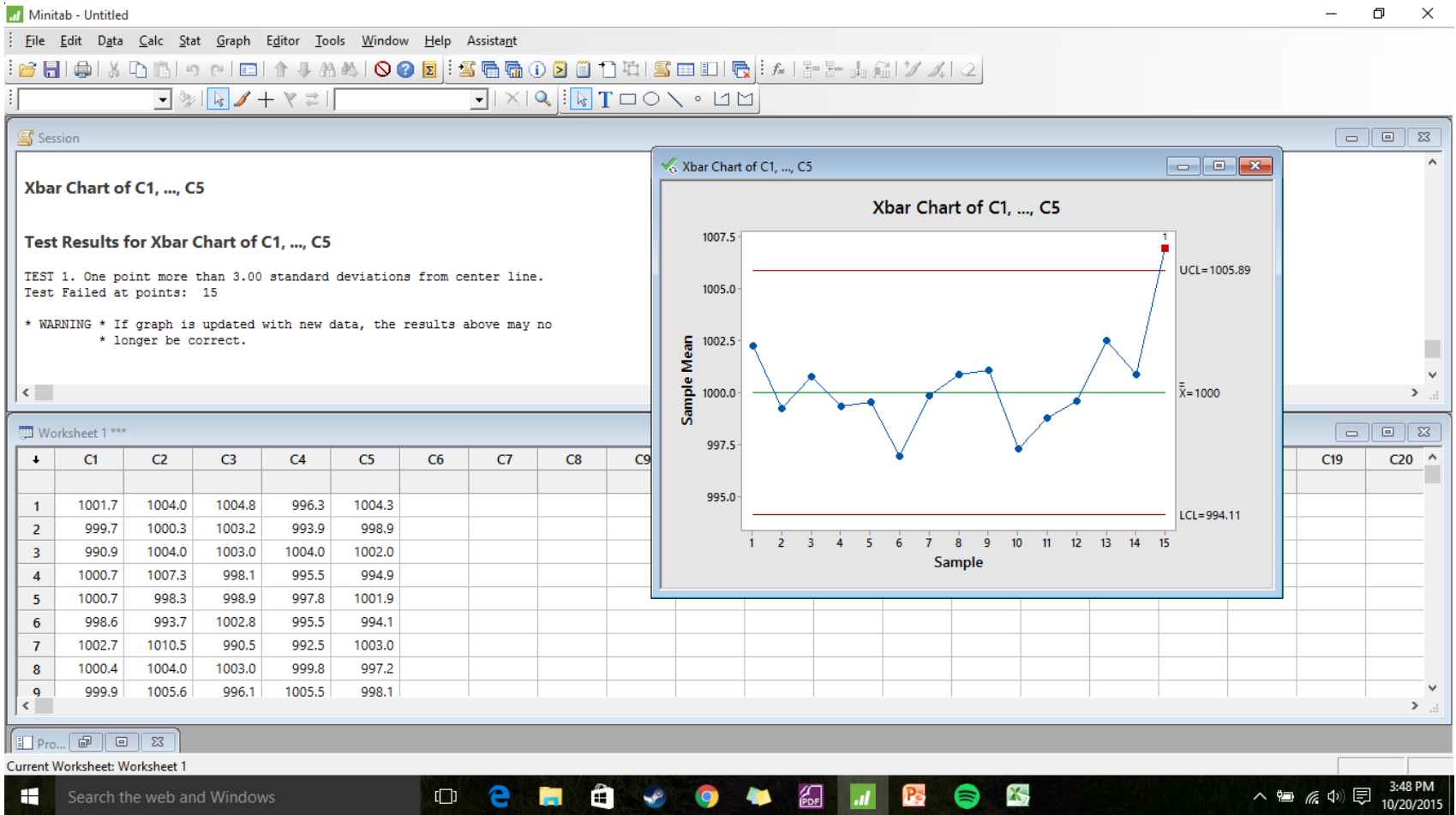


Gráfico de Controle - R

The screenshot displays the Minitab software interface. The 'Stat' menu is open, and the path 'Control Charts' > 'Variables Charts for Subgroups' > 'R' is selected. A tooltip for the 'R' chart is visible, providing instructions: 'R Monitor the variation (range) of your process when you have continuous data in subgroups. Works best with subgroup sizes of 8 or less.'

Below the menu, a data table is shown with columns C1 to C20 and rows 1 to 9. The data values are as follows:

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20
1	1001.7	1004.0	1004.8	996.3	1004.3															
2	999.7	1000.3	1003.2	993.9	998.9															
3	990.9	1004.0	1003.0	1004.0	1002.0															
4	1000.7	1007.3	998.1	995.5	994.9															
5	1000.7	998.3	998.9	997.8	1001.9															
6	998.6	993.7	1002.8	995.5	994.1															
7	1002.7	1010.5	990.5	992.5	1003.0															
8	1000.4	1004.0	1003.0	999.8	997.2															
9	999.9	1005.6	996.1	1005.5	998.1															

Parâmetros

The screenshot displays the Minitab software interface. The main window shows a session log with a warning message: "TEST 1. One point more than 3.00 standard deviations from center. Test Failed at points: 15". Below the log is a worksheet with data columns C1 through C5. The Xbar Chart of C1, ..., C5 is visible, and the R Chart Options dialog box is open, showing the "Limits" tab. The dialog box includes fields for "Lower standard deviation limit bound" (0) and "Upper standard deviation limit bound" (22.21). The "Using actual sizes of the subgroups" radio button is selected.

Session

* longer be correct.

Xbar Chart of C1, ..., C5

Test Results for Xbar Chart of C1, ...

TEST 1. One point more than 3.00 standard deviations from center.
Test Failed at points: 15

* WARNING * If graph is updated with new data, the test results may no longer be correct.

Worksheet 1 ***

	C1	C2	C3	C4	C5
1	1001.7	1004.0	1004.8	999.7	1000.3
2	999.7	1000.3	1003.2	990.9	1004.0
3	990.9	1004.0	1003.0	1000.7	1007.3
4	1000.7	1007.3	998.1	995.5	994.9
5	1000.7	998.3	998.9	997.8	1001.9
6	998.6	993.7	1002.8	995.5	994.1
7	1002.7	1010.5	990.5	992.5	1003.0
8	1000.4	1004.0	1003.0	999.8	997.2
9	999.9	1005.6	996.1	1005.5	998.1

R Chart Options

Parameters | Estimate | Limits | Tests | Stages | Box-Cox | Display | Storage

Display additional σ limits at:
These multiples of the standard deviation: 1

Place bounds on control limits:

Lower standard deviation limit bound: 0

Upper standard deviation limit bound: 22.21

When subgroup sizes are unequal, calculate control limits:

Using actual sizes of the subgroups

Assuming all subgroups have size: 2

Scale... Labels... Multiple Graphs... Data Options... R Options...

Select

Help

OK Cancel

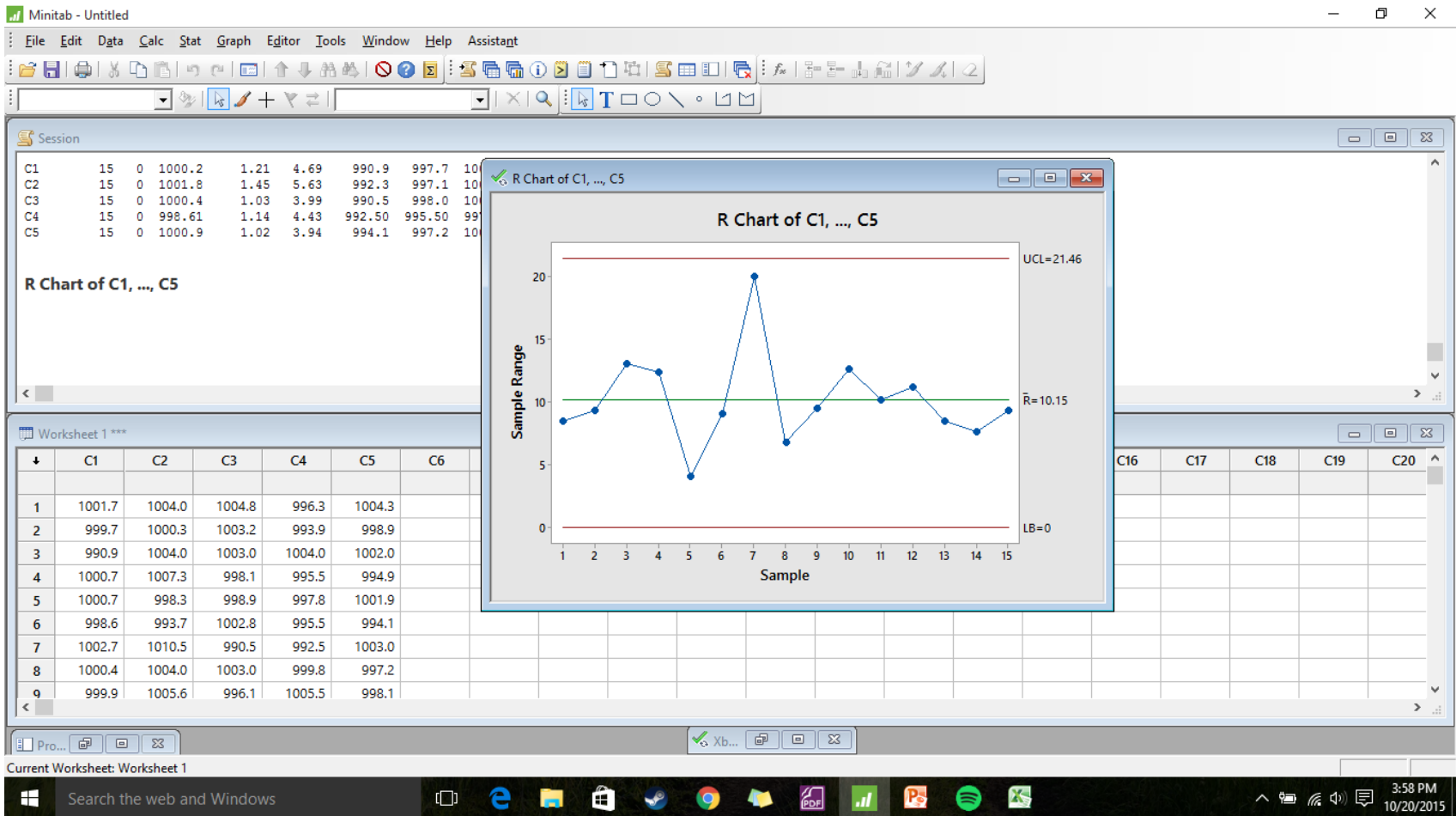
Help OK Cancel

Current Worksheet: Worksheet 1

Search the web and Windows

3:58 PM 10/20/2015

Resultado



Estatística descritiva

The screenshot displays the Minitab software interface. The 'Row Statistics' dialog box is open, showing a preview of the data and the calculated statistics. The data in the preview is as follows:

Row	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20
1	1001.7	1004.0	1004.8	996.3	1004.3															
2	999.7	1000.3	1003.2	993.9	998.9															
3	990.9	1004.0	1003.0	1004.0	1002.0															
4	1000.7	1007.3	998.1	995.5	994.9															
5	1000.7	998.3	998.9	997.8	1001.9															
6	998.6	993.7	1002.8	995.5	994.1															
7	1002.7	1010.5	990.5	992.5	1003.0															
8	1000.4	1004.0	1003.0	999.8	997.2															
9	999.9	1005.6	996.1	1005.5	998.1															

The worksheet below shows the same data for rows 1 through 9, with columns C1 through C20. The current worksheet is 'Worksheet 1'.

Média

The screenshot displays the Minitab software interface. At the top, the menu bar includes File, Edit, Data, Calc, Stat, Graph, Editor, Tools, Window, Help, and Assistant. Below the menu bar is a toolbar with various icons for file operations and data manipulation. The main workspace is divided into several panes:

- Session:** Displays a table of data with 5 rows (C1-C5) and 10 columns of numerical values.
- R Chart of C1, ..., C5:** A chart area that is currently blank.
- Worksheet 1 ***:** A spreadsheet view showing data for columns C1 through C20. The first 9 rows contain numerical data.

A **Row Statistics** dialog box is open in the center of the screen. It contains the following options:

- Statistic:** Radio buttons for Sum, Mean (selected), Standard deviation, Minimum, Maximum, Range, Median, Sum of squares, N total, N nonmissing, and N missing.
- Input variables:** A list box containing C1, C2, C3, C4, and C5.
- Store result in:** A text box containing C7.

Buttons for Select, Help, OK, and Cancel are visible at the bottom of the dialog box. The Windows taskbar at the bottom shows the system clock at 4:00 PM on 10/20/2015.

Range

The screenshot displays the Minitab software interface. At the top, the menu bar includes File, Edit, Data, Calc, Stat, Graph, Editor, Tools, Window, Help, and Assistant. Below the menu bar is a toolbar with various icons for file operations and data manipulation. The main workspace is divided into several panes:

- Session:** Displays a table of data with columns C1 through C10 and rows C1 through C5.
- R Chart of C1, ..., C5:** A chart area, currently empty.
- Worksheet 1 ***:** A data table with columns C1 through C20 and rows 1 through 9.

A **Row Statistics** dialog box is open in the center, showing the following options:

- Statistic:** Radio buttons for Sum, Mean, Standard deviation, Minimum, Maximum, Range (selected), Median, Sum of squares, N total, N nonmissing, and N missing.
- Input variables:** C1 C2 C3 C4 C5
- Store result in:** C8

The dialog box also includes buttons for Select, Help, OK, and Cancel.

	C1	C2	C3	C4	C5	C6	C7	C14	C15	C16	C17	C18	C19	C20
1	1001.7	1004.0	1004.8	996.3	1004.3		1002.0							
2	999.7	1000.3	1003.2	993.9	998.9		999.0							
3	990.9	1004.0	1003.0	1004.0	1002.0		1000.0							
4	1000.7	1007.3	998.1	995.5	994.9		999.30							
5	1000.7	998.3	998.9	997.8	1001.9		999.52							
6	998.6	993.7	1002.8	995.5	994.1		996.94							
7	1002.7	1010.5	990.5	992.5	1003.0		999.84							
8	1000.4	1004.0	1003.0	999.8	997.2		1000.88							
9	999.9	1005.6	996.1	1005.5	998.1		1001.04							

Resultado

Minitab - Untitled - [Worksheet 1 ***]

File Edit Data Calc Stat Graph Editor Tools Window Help Assistant

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20
1	1001.7	1004.0	1004.8	996.3	1004.3		1002.22	8.5												
2	999.7	1000.3	1003.2	993.9	998.9		999.20	9.3												
3	990.9	1004.0	1003.0	1004.0	1002.0		1000.78	13.1												
4	1000.7	1007.3	998.1	995.5	994.9		999.30	12.4												
5	1000.7	998.3	998.9	997.8	1001.9		999.52	4.1												
6	998.6	993.7	1002.8	995.5	994.1		996.94	9.1												
7	1002.7	1010.5	990.5	992.5	1003.0		999.84	20.0												
8	1000.4	1004.0	1003.0	999.8	997.2		1000.88	6.8												
9	999.9	1005.6	996.1	1005.5	998.1		1001.04	9.5												
10	994.3	993.2	1005.8	996.4	996.7		997.28	12.6												
11	997.4	997.1	998.0	995.6	1005.8		998.78	10.2												
12	1003.5	992.3	1000.8	1000.0	1001.2		999.56	11.2												
13	1003.4	1004.6	1001.3	997.3	1005.8		1002.48	8.5												
14	997.7	1004.6	997.0	1001.0	1003.9		1000.84	7.6												
15	1012.0	1007.0	1002.7	1008.0	1005.0		1006.94	9.3												
16																				
17																				
18																				
19																				
20																				
21																				
22																				
23																				
24																				
25																				

Current Worksheet: Worksheet 1

Search the web and Windows

4:01 PM 10/20/2015