

COMPUTER LAB#1: Tutorial How to work with MathCAD

We begin by learning to do simple computations with MathCAD.
When in doubt about syntax, come back to this page.

Simple operations

(1) Type: 3.3*4.1=

$$3.3 \cdot 4.1 = 13.53$$

(2) Type 2.4-3.5=

$$2.4 - 3.5 = -1.1$$

(3) Type: \2= (this is square root of 2).

$$\sqrt{2} = 1.414$$

(4) Type 2.3^-4.5= (this is 2.3 to the power -4.5).

$$2.3^{-4.5} = 0.024$$

(5) Type: (3.1-4.2)*4.3-6.5=

$$(3.1 - 4.2) \cdot 4.3 - 6.5 = -11.23$$

(6) Type: 7/(2.3-8.6)space bar+3=.

$$\frac{7}{(2.3 - 8.6)} + 3 = 1.889$$

(7) Type: -3.7/\2.3+8.6space bar space bar space bar =.

$$\frac{-3.7}{\sqrt{-2.3 + 8.6}} = -1.474$$

Note: remember there are text boxes (that will not compute)
and computation boxes (with their non-text rules).

(8) Now let's locate useful symbols. Whenever you need special operations or characters, you will find them in one of the auxiliary toolbars you can open by going to View, Toolbars, and selecting what you need.

Some of the toolbars already have a small icon at the top of your MathCad window. You can then access your toolbar by clicking on its icon at the top. Hovering with the mouse over any of the top icons will tell you the name of the toolbar to which it corresponds.

To insert anything from a toolbar into your file, position the cursor on the page or at a placeholder and then click on the toolbar sign.

Let's review a few of the most useful toolbars:

- Greek letter symbols (μ for the mean or σ for standard deviation for example) are in the Greek toolbar.
 - evaluation signs such as $:=$ are in the evaluation toolbar -- if you forget that you can get it by typing $:$
 - square root, e^x , $1/x$, x^2 are found in the Calculator toolbar.
 - the summation sign is in the Calculus toolbar; make sure you select the one that allows you to enter limits, bottom and top (if needed)
 - the Boolean toolbar offers some useful symbols such as "less than or equal to"
 - to enter matrices and vectors (matrices with only one column) go to the Matrix toolbar
 - the Graph toolbar helps after selecting the type desired.
- Now $\sqrt{29^2} = 29$ processing $\theta := \sum_{j=0}^9 a_j$ toolbars and $\lambda := \begin{pmatrix} 2 & 4 & 6 \\ 8 & 10 & 12 \end{pmatrix}$

Red is MatchCad's way of telling you there is an error in your work and you need to fix it to go on. Usually, it has to do with operations with variables or values that had not yet been defined.

You may have noticed that you can start writing anywhere on the MathCad "page" which is indicated by grey margins. If you want to make your work look good, you may need to move pieces around to make them fit on a page and align properly.

To move any portion around (formula or text) click on it to get the black frame around it, then "grab" the frame (point with the mouse to get a hand) and drag into place. The black placeholders around a frame allow you to pull to make things bigger or smaller.

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(9) Enter a vector of numbers:

- call it a, type a= (starting lower on the page to give it room)
 - go to View, Toolbars, and select Matrix;
 - in the matrix toolbar, select the first option (which looks like a small table in parentheses);
 - in the dialog box, enter 10 for the number of rows, and 1 for the columns.
- You have now a template for a vector, and you can enter your own values (see mine below):

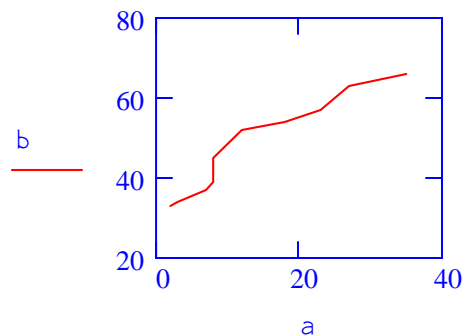
$$a := \begin{pmatrix} 2 \\ 3 \\ 7 \\ 8 \\ 8 \\ 12 \\ 18 \\ 23 \\ 27 \\ 35 \end{pmatrix}$$

Repeat the procedure to enter a vector b of the same size (10 rows, 1 column):

$$b := \begin{pmatrix} 33 \\ 34 \\ 37 \\ 39 \\ 45 \\ 52 \\ 54 \\ 57 \\ 63 \\ 66 \end{pmatrix}$$

Now let's graph vector b against vector a:

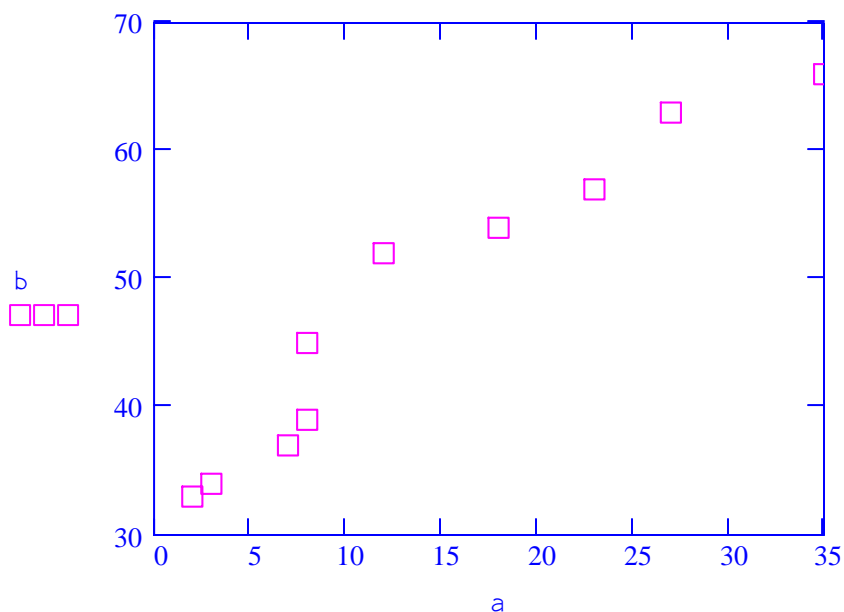
- go to View, Toolbars, Graph and select the graph icon
- or
- go to Insert, Graph and select the X-Y plot
- in the figure that opens, write a at the bottom placeholder and b at the left placeholder
- click outside the graph



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Now try to make it look better, by:

- enlarging it (click inside, then pull on the bottom corner)
- positioning it in the center (click inside, then on the edge - obtain a little hand, indicating that you can move the graph, then move it around)
- right-clicking the mouse inside the graph and select Format:



For example, select Traces (you have only one here, so work on the first line) and then make it a point graph by selecting a symbol for the points and then by selecting "none" for line. Play with the shapes and colors.

If you feel courageous, make up a vector c (of the same dimensions as a and b -- 10 rows and 1 column) and graph it against a by:

- going into the a - b graph
- typing a comma (,) after b on the left, which puts you on a second line with a placeholder where you can enter c .

Now you have to traces (b against a and c against a) and you can format the new trace (second line in the formatting dialog box) to make it look different from the first trace.

NOTE: to be able to add vector c , you need to add it above the graph (otherwise the graph will give a red error message saying c is not defined).

If you think you don't have enough room, click on the graph and then its edge to obtain the hand, and drag the graph down to make room for the new vector c .

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