Concepts in Mathematics

By David Alderoty © 2015

Chapter 7) Illustrating and Writing Mathematics with Microsoft Word, with the Mathematics Add-In

Over 950 Words

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Notes for This Chapter

When I refer to Microsoft Word, or a Word document, in the following subsections, I am referring to Microsoft Word 2010 or later, with the Microsoft Mathematics Add-In. The problems discussed in this chapter, and the related techniques to circumvent the difficulties, might **not** apply to versions of the software that are released after May 2015.

This chapter presents a brief introduction to the software, with examples. If you want detailed instructions on how to use Microsoft Word with the Mathematics Add-In, see the web-based articles and videos at the end of the chapter.

Microsoft Word, with the Mathematics Add-In

Introduction to Microsoft Word, with the Mathematics Add-In

Microsoft Word 2010 or later with the free Microsoft Mathematics Add-In is excellent software for writing about mathematics. With this software, you can create almost any type of mathematical

expression, in a conventional Word.document, with the file extension .docx. (The Mathematics Add-In does **not** function with the older .dox Word format.)

This software **also performs mathematical** calculations directly in a Word document, which includes algebra, trigonometry, and calculus. This includes computer-generated graphs of equations and inequalities.

The Word document and related mathematics can be converted to PDF, and HTML webpages, with the conversion functions in Microsoft Word. When converting to HTML, it is necessary to check the results, because there are sometimes problems with the conversion process. There are a couple of other minor difficulties with this software, which can be circumvented with the techniques described in the following subsections.

Downloading the Free Microsoft Mathematics Add-In

You can download the free mathematics add-in for Microsoft Word, by clicking on the blue underlined words. If the above link fails, or if you want to be certain of obtaining the latest version of the software, click on the following link for a Google search: Latest version of Microsoft Mathematics Add-In for Word.

Illustrating Step-By-Step Solutions, and Overcoming a Problem With The Software

It is easy to illustrate step-by-step solutions, with Microsoft Word, such as the following example:

Manual calculation

$$2x - 22 = 60$$
$$2x = 60 + 22$$
$$2x = 82$$
$$x = \frac{82}{2}$$
$$x = 41$$

When illustrating step-by-step solutions in Microsoft Word, such as the above, it is best to use a single matrix column, such as the following:

$$\square$$
$$\square$$
$$\square$$

This column is only three rows, but you can increase the number of rows, or reduce them to as little as a single row, with the functions in the software. I devised the above technique, to keep mathematical expressions on the same line.

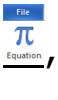
Without the above technique, Microsoft Word may present a mathematical expression as follows: $Y - 3x - 234 - 10y = 23 + 5y - 678 - 120000 - 45678y$

The above difficulty **very frequently occurs** when a Word document is converted to HTML, but it can easily be eliminated as

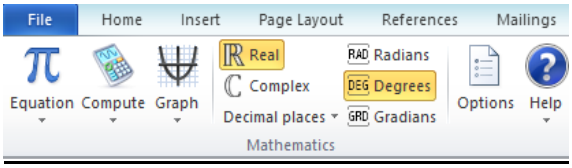
shown below.

When this expression is placed in a matrix ⬚ the problem is eliminated, and it is displayed on one line, as shown below:

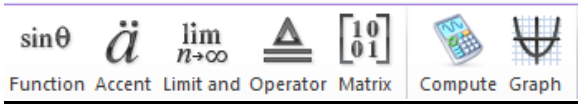
$$2Y - 3x - 234 - 10y = 23 + 5y - 678 - 120000 - 45678y$$

The matrix boxes can be accessed by clicking on 

,



Then click on 



When equation or inequalities are placed in matrix boxes, as shown above, the calculation mechanism will not function. **Of course**, the matrix boxes were not created for the purpose described above. Matrix boxes are designed for matrix calculations, such as the following two examples:

$$\begin{matrix} 3 & 7 \\ 2 + & 7 \\ 3 & 12 \end{matrix} = \begin{pmatrix} 10 \\ 9 \\ 15 \end{pmatrix}$$

$$\begin{matrix} 10x & 7x \\ 6y & -7y \\ 31 & 21 \end{matrix} = \begin{pmatrix} 3\,x \\ -y \\ 10 \end{pmatrix}$$

Numbers and variables that are placed in matrix rows and columns in the conventional style can be calculated by the software, such as the two examples presented above.

Calculations in Word, with the Mathematics Add-In Requires Proper Placement of the Equal Sign (=)

There are some minor difficulties associated with the Microsoft Word calculation mechanism. To obtain a calculated result you must **not** use an equal sign (**=**) when you want to software to carry out calculations. The **EXCEPTIONS** to this are **calculations associated with integrals, algebra, and graphing**. However, for illustration purposes, you can place the equal sign (**=**), followed by the result, after the software has completed a calculation. The above can also be placed in a matrix box, when the calculations are completed, to be certain that mathematical expressions will be presented on a single line.

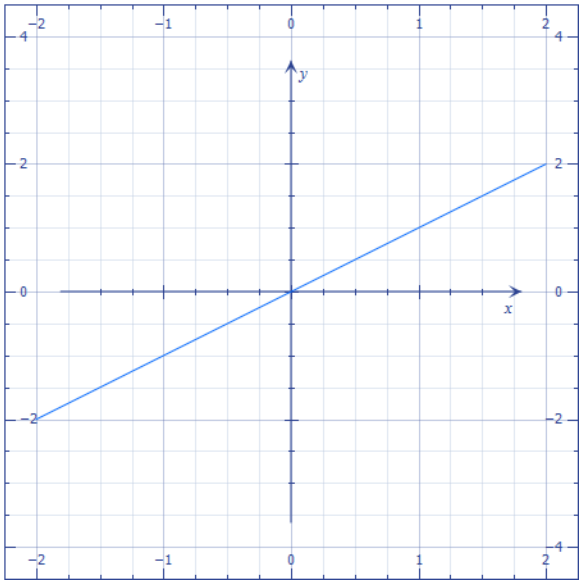
Examples of Graphs, Algebra, and Calculus with Microsoft Word, with the Mathematics Add-In

The Graphing Functionality of Microsoft Word, With the Mathematics Add-In

Microsoft Word has excellent graphing capabilities, with the Mathematics add-in. This software can produce two and three-dimensional graphs of equations and inequalities. Up to seven equations and/or inequalities can be placed on a single graph. See the following examples:

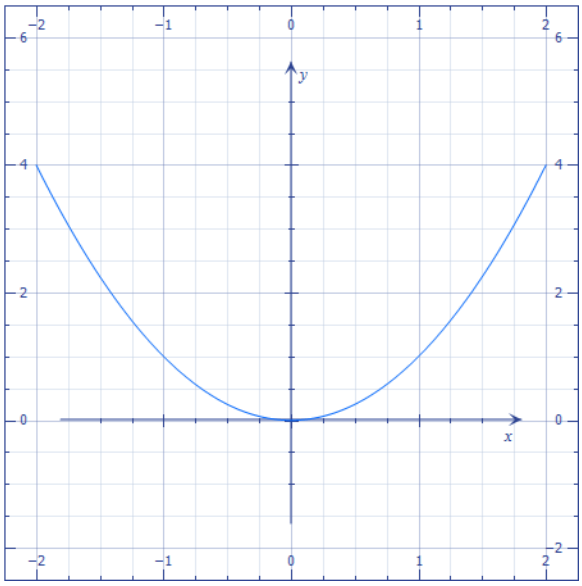
Example 1

$y = x$



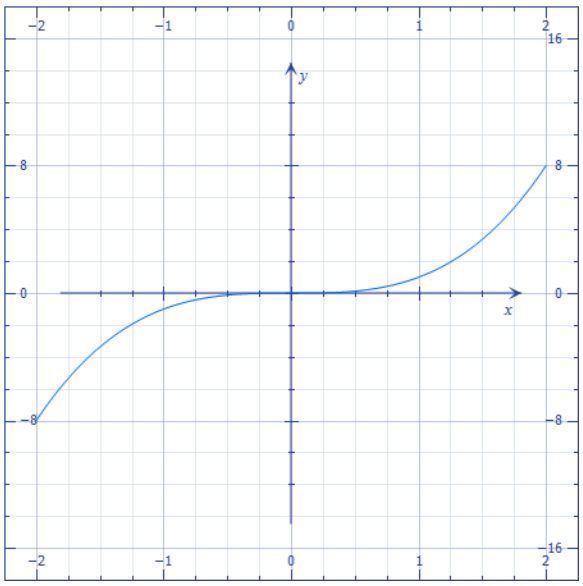
Example 2

$y = x^2$



Example 3

$y = x^3$



Example 4

$y = x^3$

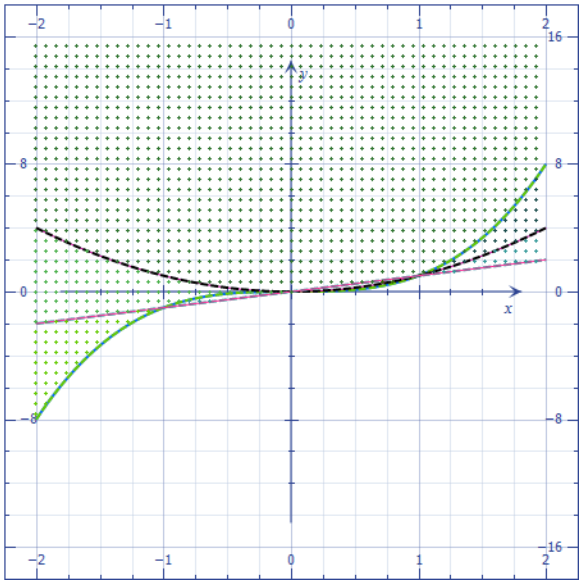
$y > x^3$

$y = x^2$

$y > x^2$

$y > x$

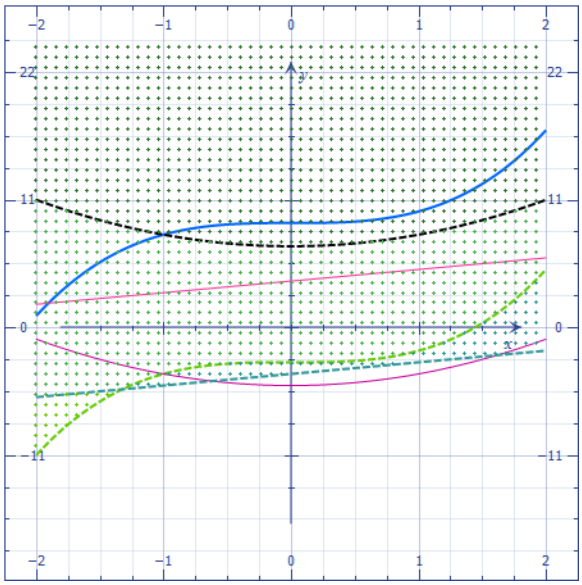
$y = x$



Example 5

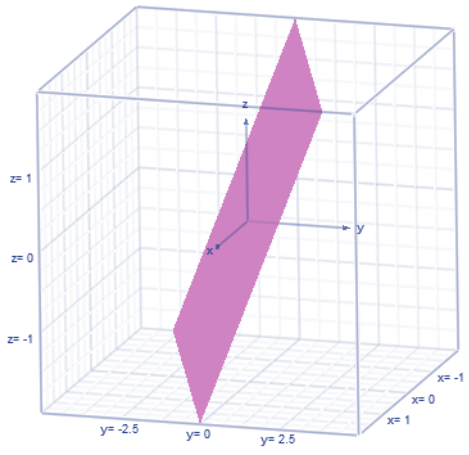
$y = x^3 + 9$

$$y > x^3 - 3$$
$$y = x^2 - 5$$
$$y > x^2 + 7$$
$$y > x - 4$$
$$y = x + 4$$



Example 6

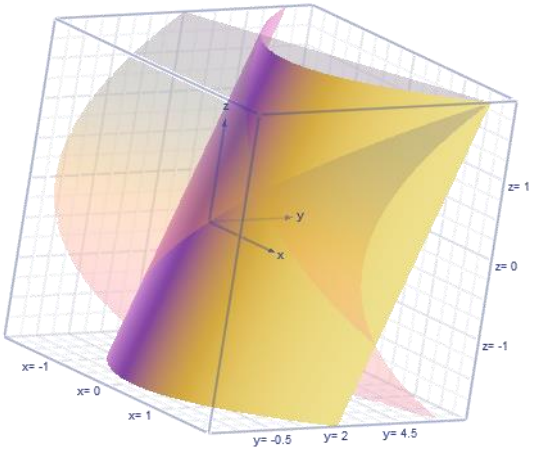
$$y = x + z$$



Example 7

$$y = x^2 + z$$

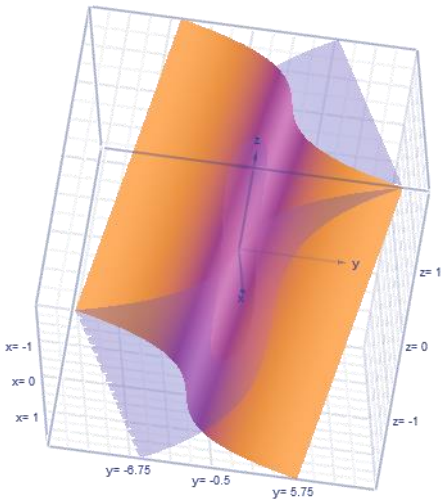
$$y = x + z^2$$



Example 8

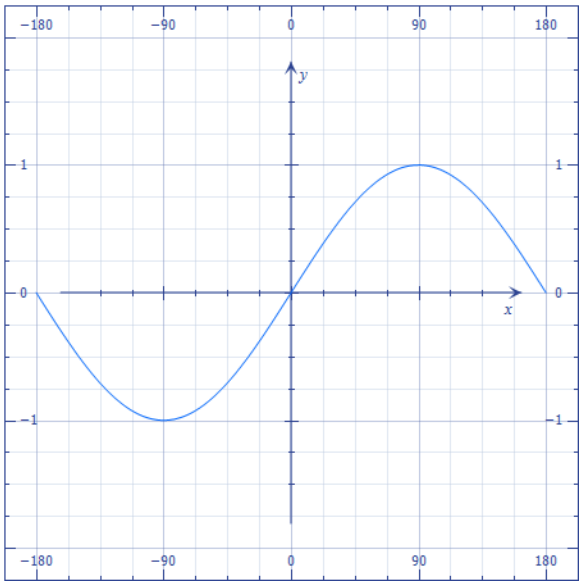
$$y = x^3 + z$$

$$y = x + z^3$$



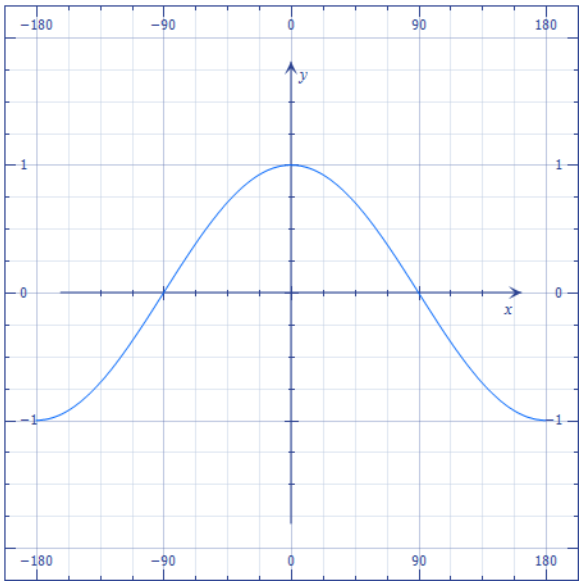
Example 9

$y = \sin x$



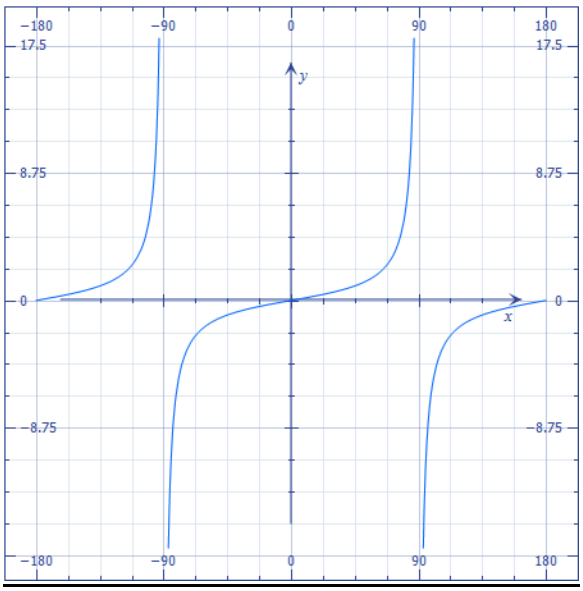
Example 10

$y = \cos x$



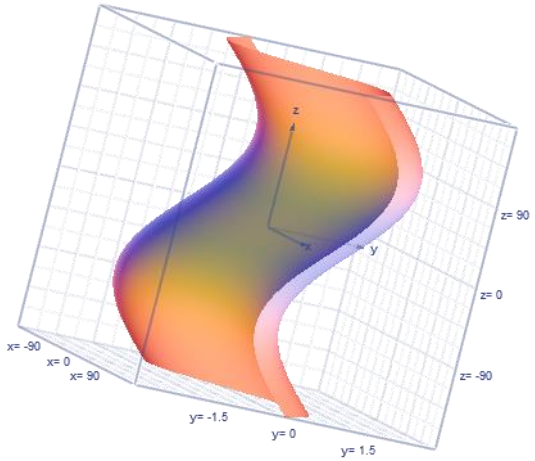
Example 11

$y = \tan x$



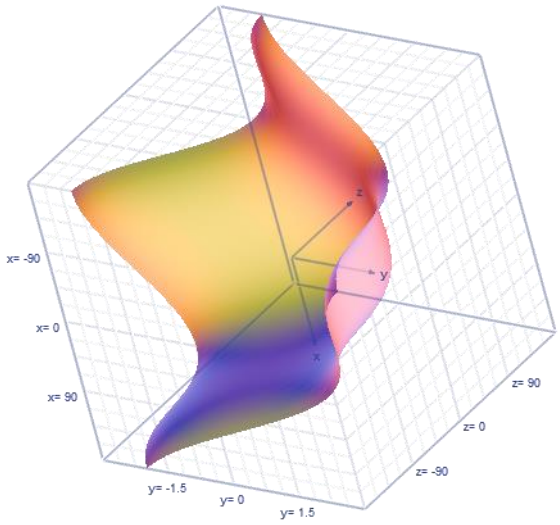
Example 12

$$y = \sin x + \sin z$$



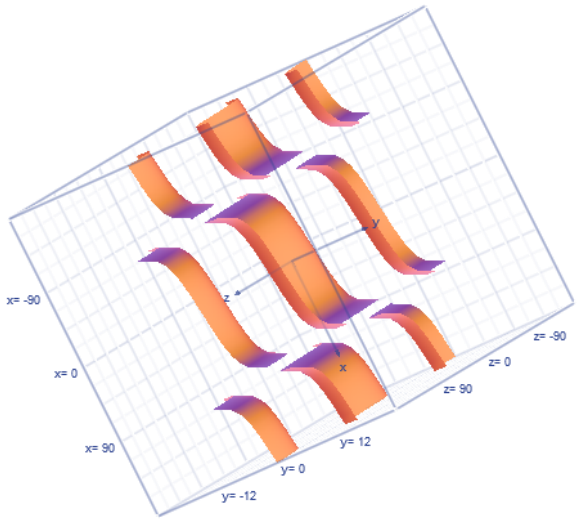
Example 13

$$y = \cos x + \cos z$$



Example 14

$$y = \tan x + \tan z$$



The Following Three Examples Are Algebra Problems Solved Step-By-Step

Example 1
Manual Calculation

$$4x^2 + 4 = 68$$
$$4x^2 = 68 - 4$$
$$4x^2 = 64$$

$$x^2 = \frac{64}{4}$$

$$x^2 = 16$$
$$x = 4 \ or \ x = -4$$

Calculation checked with software

$$4x^2 + 4 = 68$$
$$x = -4 \ or \ x = 4$$

Example 2
Manual Calculation

$$3y + 3 = 8$$
$$3y = 8 - 3$$
$$3y = 5$$

$$y = \frac{5}{3}$$

$$y \approx 1.66666667$$

Calculation checked with software

$$3y + 3 = 8$$

$$y = \frac{5}{3}$$

Example 3
Manual Calculation

$$\frac{3z}{10}+\frac{5z}{3}=100$$

$$\frac{(10)3z}{10}+\frac{(10)5z}{3}=(10)100$$

$$3z+\frac{50z}{3}=1000$$

$$(3)3z+\frac{(3)50z}{3}=(3)1000$$

$$9z+50z=3000$$
$$59z=3000$$

$$z=\frac{3000}{59}$$

$$z\approx 50.8474576271$$

Calculation checked with software

$$\frac{3z}{10}+\frac{5z}{3}=100$$

$$z=\frac{3000}{59}$$

The Following Three Examples Are integral Calculus Problems Solved Step-By-Step

Example 1

Manual Calculation

$$\int_1^4 x dx$$

$$\int_1^4 x dx = \frac{x^2}{2} =$$

$$\frac{4^2 - 1}{2} =$$

$$\frac{16 - 1}{2} =$$

$$\frac{15}{2} = 7.5$$

Calculation checked with software

$$\int_1^4 x dx = \frac{15}{2}$$

Example 2

Manual Calculation

$$\int_2^{12} x^2 dx$$

$$\int_2^{12} x^2 dx = \frac{x^3}{3} =$$

$$\frac{12^3 - 2^3}{3} =$$

$$\frac{1728 - 8}{3} =$$

$$\frac{1720}{3} \approx 573.33333333$$

Calculation checked with software

$$\int_2^{12} x^2 dx = \frac{1720}{3}$$

Example 3
Manual Calculation

$$\int_0^2 (2x+1)dx$$

$$\int_0^2 (2x+1)dx = \frac{2x^2}{2} + x =$$

$$\frac{2(2^2)}{2} + 2 =$$

$$\frac{8}{2} + 2 =$$

$$4 + 2 = 6$$

Calculation checked with software

$$\int_0^2 (2x+1)dx = 6$$

For Supporting Information, Alternative Perspectives, and Additional Information, from Other Authors, on Algebra See the following Websites

1) Google Videos: How to use Microsoft Mathematics Add-In for Word, **2) YouTube Videos:** How to use Microsoft Mathematics Add-In for Word, **3) MASHPEDIA Videos:** How to use Microsoft Mathematics Add-In for Word **NOTE:** Mashpedia has a large

number of videos, on a number of webpages. To go from one webpage to another on Mashpedia, scroll to the **BOTTOM** of the webpage, and click on: **NEXT >>**, **4)** Video How to use the Math Add-in in Word, **5)** Microsoft Mathematics Add-In For Word And OneNote, by Usman Javaid.

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