PTC®

PTC® Mathcad Prime® 3.1 Migration Guide

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Contents

About This Guide

This Migration Guide is intended for users of the previous versions of Mathcad who are migrating to PTC Mathcad Prime.

How to Use This Guide

This guide supplements the PTC Mathcad Help Center. This guide assumes you are already familiar with PTC Mathcad functionality.

Use this guide to learn about converting your files from earlier versions of Mathcad to PTC Mathcad Prime. Step-by-step procedures are provided here for converting your legacy worksheets to PTC Mathcad Prime worksheets. Information on troubleshooting file conversion issues is also given.

Technical Support

Contact PTC Technical Support via the PTC Web site, phone, fax, or e-mail if you encounter problems using your software. For more information, see Opening and Tracking a Call to Technical Support in the *PTC Customer Service Guide* enclosed with your shipment. The guide is also on the PTC Support Web page at http://www.ptc.com/support/index.htm.

You must have a Service Contract Number (SCN) before you can receive technical support. If you do not have a number, contact PTC License Management using the instructions in your *PTC Customer Service Guide* under License Management. You can receive free technical support for the first 30 days after purchasing new software from PTC. If you do not have a SCN, you can contact technical and licensing support at http://www.ptc.com/appserver/cs/mathcad_logger/options.jsp

If you run into issues with installation or licensing, and need further assistance, go to http://www.ptc.com/support/mathcad_supportCenter.htm.

Documentation

PTC provides documentation on the product CD-ROM in the following forms:

- Help Center with context-sensitive help and tutorials
- *PTC Mathcad Prime 3.1 Read This First* in PDF format

To access the Help Center or the Getting Started Tutorial, click  or press F1. You can also click any item on the user interface Ribbon or any function in the worksheet and press F1 to open the relevant Help topic.

Feedback to Documentation

PTC welcomes your suggestions and comments on its documentation—send feedback to the following address:

mathcad-documentation@ptc.com

Please include the name of the application and its release with your comments.

Documentation Conventions

Convention	Item	Example
Bold	Buttons and other selectable elements or options from the Ribbon	Click **Calculation** ▸ **Calculation Options** Click **Approximate Equality**.
Courier	User input, system messages, directories, and file names	`Processing completed.`
Courier with less-than and greater-than symbols (< >)	Variables for which the user substitutes an appropriate value	`output=<25`

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Converting Legacy Files

Legacy files are worksheets and templates that were created using previous versions of PTC Mathcad. You cannot open such legacy files directly in PTC Mathcad Prime 3.1. However, you can use the PTC Mathcad Prime 3.1 **XMCD, MCD Converter** to convert `.mcd`, `.xmcd`, and `.xmcdz` legacy worksheets to `.mcdx` format. You can also use the converter to convert legacy `.mct` and `.xmct` template files to PTC Mathcad Prime 3.1 `.mctx` format.

This chapter provides instructions for using the converter.

Note

- To convert legacy PTC Mathcad files to PTC Mathcad Prime 3.1 `MCDX` format, you must have PTC Mathcad 15.0 M010 installed. Otherwise, the converter will not function properly. You can download PTC Mathcad 15.0 M010 from http://www.ptc.com/products/mathcad/mathcad-15-0/free-trial.htm.
- You can use your PTC Mathcad Prime 3.1 license for PTC Mathcad 15.0 as well.

Before Converting

Check your legacy worksheet to see if it contains any of the following items, and then take the appropriate actions before starting the conversion process.

Locked Areas

The XMCD, MCD Converter cannot process legacy files that contain collapsed locked areas. You must unlock any locked collapsed areas before converting the worksheet.

Using the XMCD, MCD Converter

1. To start the XMCD, MCD Converter, on the **Input/Output** tab, in the **PTC Mathcad Worksheets** group, click **XMCD, MCD Converter**. The converter opens.

   Alternatively, you can start it from the **Start** menu.
2. Click **Add Worksheets**. The **Open** dialog box opens.
3. Browse for and select the legacy worksheets, and then click **Open**. The file names that you selected, with their full path, appear in the **Source Worksheet** column. The version of Mathcad you used to create the legacy worksheet appears in the **Version** column.
4. Click **Add References**. If the worksheet contains references to other worksheets, they appear in the converter.
5. Select the desired worksheets and click **Convert**. The conversion process starts and the **Status** changes to **In Progress**. If the conversion is successful, the **Status** changes to **Converted**, otherwise it changes to **Failed**.

   For each successful conversion, the converter creates a new file with a `.mcdx` file extension in the same folder as the source file. The source file is not modified.

   The XMCD, MCD Converter displays a conversion log that lists all the issues found during conversion. Click a worksheet name to see its log. The XMCD, MCD Converter stores all the log files in the directory that contains your legacy files. You can open log files with a text editor like Notepad or an XML editor.
6. Open a converted worksheet and then press Ctrl+F5 to recalculate the worksheet and view the updated results.

Note

- The worksheets generated by the XMCD, MCD Converter cannot be read by previous versions of PTC Mathcad Prime.
- You can continue working in PTC Mathcad Prime 3.1 while files are being converted.

Understanding the Conversion Results

When you convert legacy worksheets, all regions that require your attention are annotated. A red line segment appears to the left of the affected region and a red arrow points to the affected region. For example, a region might contain a function with different solving algorithm, a different display, or a feature that is unsupported in PTC Mathcad Prime 3.1. Features that are not available in PTC Mathcad Prime 3.1 are converted as images, so that no information is lost. All annotated differences belong to one of the following categories:

- Display differences
- Calculation differences
- Unsupported features and formatting (not available in PTC Mathcad Prime 3.1)

To understand and handle annotated regions, perform the following steps:

1. In a converted worksheet, click an annotated region. The annotation appears below the region.
2. Read the annotation message and resolve any conversion issues.
3. After you edit all the annotated regions, on the **Input/Output** tab, in the **PTC Mathcad Worksheets** group, click **Clear Annotations**. The annotation marks disappear.

Note

Clear Annotations removes all the annotations in the worksheet at once. Do not click this button until you have reviewed all the issues.

Refer to Resolving Conversion Issues for information on resolving conversion issues.

Display Differences

The display of some features is different in PTC Mathcad Prime 3.1. These display differences do not affect calculation results.

Fractional Results and Mixed Number Formatting

The result is formatted according to the default PTC Mathcad Prime 3.1 worksheet style.

Nondecimal Expressions

In PTC Mathcad Prime 3.1, binary, octal, and hexadecimal base numbers lose their “b”, “o”, and “h” postfix. These numbers are converted to decimal numbers. The other letters in a hexadecimal number are also converted.

Complex Numbers

In previous versions of Mathcad, you entered z:=2π*1i and the displayed result was z:=2π*i, but in PTC Mathcad Prime 3.1 the displayed result is z:=2π*1i (the imaginary unit is prefixed with the number 1). A new polar operator allows you to display complex results in polar form.

Parentheses

Some parentheses in previous versions of Mathcad that are only used for display purposes are not converted. For example, consider the following equation:

$$Q(i,j) := m_{(i,j)} + n_{(j,i)}$$

Subscripts appear without parentheses when converted by PTC Mathcad Prime 3.1:

$$Q(i,j) := m_{i,j} + n_{j,i}$$

The meaning of the resulting equation is identical.

Spaces in Variable Names

In previous versions of Mathcad, you can have spaces in variable names. When converted by PTC Mathcad Prime 3.1, each space is replaced by an underscore:

Previous versions of Mathcad	PTC Mathcad Prime 3.1
fa b c := 20	$fa\_b\_c := 20$
$f_{y\ abc} := 30$	$f_{y\_abc} := 30$

Display Precision in Results

PTC Mathcad Prime 3.1 can display up to 15 decimal places in results. This affects the conversion of results.

Previous versions of Mathcad	PTC Mathcad Prime 3.1
ln(2) = 0.69314718055994530 Displays 17 decimal places	$\ln(2) = 0.693147180559945$ Displays 15 decimal places

Note

The precision of internal results is the same.

Derivatives

The display of partial derivatives is not supported in PTC Mathcad Prime 3.1. They appear as derivative operators.

Previous versions of Mathcad	PTC Mathcad Prime 3.1
$\frac{\partial}{\partial y_j} f_i$	$\frac{d}{dy_j} f_i$

Note

The partial derivative variables use literal subscripts.

Symbolic Evaluation

- Stacking of Symbolic Keywords and Modifiers

In previous versions of Mathcad, the keyword and modifier placeholders are to the left of the symbolic evaluation operator. In PTC Mathcad Prime 3.1, they are above it.

Previous versions of Mathcad	PTC Mathcad Prime 3.1
$e^{x}\left\vert \begin{matrix}\text{series}\\ \text{substitute},x=2\end{matrix}\right.\rightarrow \frac{109}{15}$	$e^{x}\ \overset{\begin{matrix}series\\ substitute,x=2\end{matrix}}{\longrightarrow}\ \frac{109}{15}$

- Programming Operator

  The display of PTC Mathcad Prime 3.1 symbolic evaluation results containing programming operators appears slightly different.

Previous versions of Mathcad

$$(3a-7)\cdot x=1\ \text{solve},x,\text{fully}\ \rightarrow \begin{cases}\frac{1}{3\cdot a-7} & \text{if } a\neq\frac{7}{3}\\ \text{undefined} & \text{if } a=\frac{7}{3}\end{cases}$$

PTC Mathcad Prime 3.1

$$(3\ a-7)\ x=1\ \overset{solve,x,fully}{\longrightarrow}\ \begin{cases}\text{if } a\neq\frac{7}{3}\\ \quad \frac{1}{3\cdot a-7}\\ \text{else if } a=\frac{7}{3}\\ \quad undefined\end{cases}$$

- Collapsed Nested Matrices

  PTC Mathcad Prime 3.1 does not support the display of collapsed nested matrices in symbolic evaluation results.

Previous versions of Mathcad

$$m1:=\begin{pmatrix}1 & 2\\ 4 & 3\end{pmatrix}\qquad m2:=\begin{pmatrix}5 & 7\\ 6 & 8\end{pmatrix}$$

$$m4:=(m1\ \ m2)\rightarrow(\{2,2\}\ \ \{2,2\})=(\{2,2\}\ \ \{2,2\})$$

PTC Mathcad Prime 3.1
$m1 := \begin{bmatrix} 1 & 2 \\ 4 & 3 \end{bmatrix} \quad m2 := \begin{bmatrix} 5 & 7 \\ 6 & 8 \end{bmatrix}$
$m4 := [m1 \;\; m2] \rightarrow \begin{bmatrix} \begin{bmatrix} 1 & 2 \\ 4 & 3 \end{bmatrix} & \begin{bmatrix} 5 & 7 \\ 6 & 8 \end{bmatrix} \end{bmatrix} = [[2 \times 2] \;\; [2 \times 2]]$

- Long Symbolic Results

  In previous versions of Mathcad, long symbolic results are displayed fully and you must scroll to the right to see the full result. PTC Mathcad Prime 3.1 truncates the display of long results and places three ellipses at the truncation point. Clicking the math region displays a resize bar for making the region width smaller or larger.
- Symbolic Expressions or Keywords

  Unlike previous versions of Mathcad, PTC Mathcad Prime 3.1 does not support the hiding of:

  - Left-hand side expressions
  - Keywords
- Symbolic Expressions Using the *assume* Keyword

  The converter modifies the *assume=real* keyword to *assume,ALL=real* modifier:

Previous versions of Mathcad	PTC Mathcad Prime 3.1
$\left(2^{b}\right)^{c}$ simplify, assume = real $\rightarrow 2^{b \cdot c}$	$\left(2^{b}\right)^{c} \xrightarrow{simplify, assume, ALL = real} 2^{b \cdot c}$

Data Tables

In previous versions of Mathcad, data tables are used to define data sets. The table elements are entered directly by the user or imported from a file. If the table is not resized, then the display shows only the first ten elements along with three horizontal ellipses if there are more elements in the table. PTC Mathcad Prime 3.1 converts legacy data tables to matrices and the display of such matrices shows the first twelve elements along with three vertical ellipses if there are more elements in the matrix.

Previous versions of Mathcad	PTC Mathcad Prime 3.1
T2 := | | 0 | 1 | | 0 | 0 | 0 | | 1 | 4.292 | 4.292 | | 2 | 8.584 | 8.584 | | 3 | 12.875 | 12.875 | | 4 | 17.167 | 17.167 | | 5 | 21.459 | 21.459 | | 6 | 25.751 | 25.751 | | 7 | 30.042 | 30.042 | | 8 | 34.334 | 34.334 | | 9 | 38.626 | ... |	$T2 := \begin{bmatrix} 0 & 0 \\ 4.2918 & 4.2918 \\ 8.5835 & 8.5835 \\ 12.8753 & 12.8753 \\ 17.1671 & 17.1671 \\ 21.4588 & 21.4588 \\ 25.7506 & 25.7506 \\ 30.0424 & 30.0424 \\ 34.3341 & 34.3341 \\ 38.6259 & 38.6259 \\ 42.9177 & 42.9177 \\ 47.2095 & 47.2095 \\ & \vdots \end{bmatrix}$

Operators with Multiple Forms

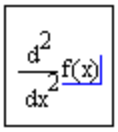
Some operators have multiple forms in previous versions of Mathcad. PTC Mathcad Prime 3.1 uses a single operator with multiple placeholders, to make it easier to use whichever form you want. The additional placeholders can be filled in or left empty.

- Square root and Nth root

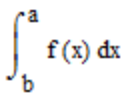
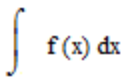
Previous versions of Mathcad		PTC Mathcad Prime 3.1	
Square Root	$\sqrt{3} = 1.732$	Insert both the Square Root and Nth Root operators by pressing \	$\sqrt{3} = 1.732$
Nth Root	$\sqrt[2]{3} = 1.732$		$\sqrt[2]{3} = 1.732$

- Derivative and Nth derivative

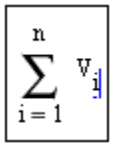
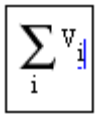
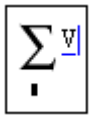
Previous versions of Mathcad		PTC Mathcad Prime 3.1	
Derivative	$\frac{d}{dx} f(x)$	Insert both forms of the derivative operator by pressing: Ctrl+Shift+D	$\frac{d}{dx} f(x)$

Previous versions of Mathcad		PTC Mathcad Prime 3.1	
Nth Derivative			$\frac{d^2}{dx^2}f(x)$

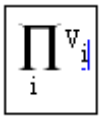
- Definite integral and indefinite integral

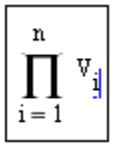
Previous versions of Mathcad		PTC Mathcad Prime 3.1	
Definite integral		Insert both forms of the integral operator by pressing: Ctrl+Shift+I	$\int_b^a f(x)\,dx$
Indefinite integral			$\int f(x)\,dx$

- Summation

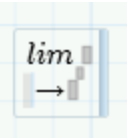
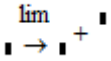
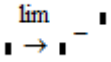
Previous versions of Mathcad		PTC Mathcad Prime 3.1	
Summation		Insert the three forms of the Summation operator by pressing: Ctrl+Shift+$	$\sum_{i=1}^{n} V_i$
Range Variable Summation			$\sum_i V_i$
			$\sum V$

- Product

Previous versions of Mathcad		PTC Mathcad Prime 3.1	
Range Variable Iterated Product		Insert both forms of the Product operator by pressing: Ctrl+Shift+#	$\prod_i V_i$

Previous versions of Mathcad		PTC Mathcad Prime 3.1	
Iterated Product			

- Limit

Previous versions of Mathcad		PTC Mathcad Prime 3.1	
Two-sided limit		Insert all three forms of the limit operator by pressing: Ctrl+L	
Right-hand limit			
Left-hand limit			

- Symbolic Evaluation

Previous versions of Mathcad		PTC Mathcad Prime 3.1	
Symbolic Evaluation		Insert both forms of the symbolic operator by pressing: Ctrl+. (period)	
Symbolic Keyword Evaluation			

WRITEPRN and APPENDPRN Functions

The **WRITEPRN** and **APPENDPRN** functions are converted into different PTC Mathcad Prime 3.1 formats.

Previous versions of Mathcad	PTC Mathcad Prime 3.1
$M := \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{pmatrix}$	$M := \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$
WRITEPRN("bob") := M	WRITEPRN("bob", M) $= \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$
READPRN("bob.prn") $= \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{pmatrix}$	READPRN("bob.prn") $= \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$

Previous versions of Mathcad	PTC Mathcad Prime 3.1
APPENDPRN("bob") := M	APPENDPRN("bob", M) $= \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$
READPRN("bob.prn") $= \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 1 & 2 & 3 \\ 4 & 5 & 6 \end{pmatrix}$	READPRN("bob.prn") $= \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$

PTC Mathcad Prime 3.1 converts the definitions WRITEPRN(“file”):=M and APPENDPRN(“file”):=M to WRITEPRN(”file”, M)= and APPENDPRN(”file”, M)= respectively.

WRITECSV and WRITEEXCEL Functions

The **WRITECSV** and **WRITEEXCEL** functions are converted into different PTC Mathcad Prime 3.1 formats.

Previous versions of Mathcad
WRITECSV(M, "excelcsvMC15.xlsx") $= \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{pmatrix}$
WRITEEXCEL(M, "excelMC15.xlsx") $= \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{pmatrix}$

PTC Mathcad Prime 3.1
$\text{WRITECSV}(\text{“excelcsvMC15.xlsx”}, M) = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$ $\text{WRITEEXCEL}(\text{“excelMC15.xlsx”}, M) = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$

PTC Mathcad Prime 3.1 swaps the first two arguments.

Excel Components

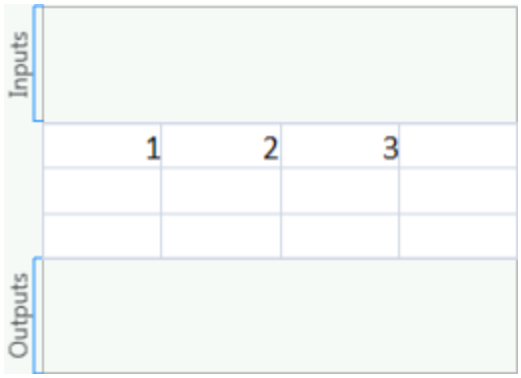
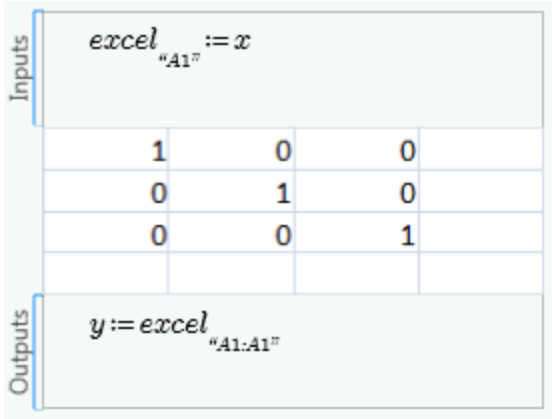
Excel components have a new format in PTC Mathcad Prime 3.1. When you convert a legacy Excel component, the converter adds input and output expressions to fit the new format.

Whether created from an external file or from typing in data, Excel components are treated identically by the converter. If the converted Excel component is linked to an external file, the converter embeds the data inside the Excel component. The converted worksheet is not linked to the external file.

An Excel component that is displayed as an icon in previous versions of Mathcad is converted to an Excel component with a single cell displayed.

Note

You must have Excel 2003 or later installed for the conversion to work properly.

Previous versions of Mathcad	PTC Mathcad Prime 3.1
Excel component with no inputs and outputs. 1 2 3	Excel component with empty **Inputs** area and **Outputs** area. 
Excel component with inputs and outputs. *x* is the input variable. *y* is the output variable. y := 1 0 0 0 1 0 0 0 1 x	The inputs and outputs are converted to input and output expressions. 

Other notable differences for Excel components are listed here:

- In previous versions of Mathcad, when you open the Excel component table, the Excel ribbon is a part of the Mathcad menu. In PTC Mathcad Prime 3.1, a separate Excel window opens to show the full Excel component table.
- If a component table in the legacy file contains the value of *NaN*, the converter changes the cell's value to blank. Like any other blank cell, if you assign a blank cell to an output variable, its value is 0.
- PTC Mathcad Prime 3.1 does not support the use of an Excel component to define functions. If a legacy file contains a function definition that depends on an Excel component, the conversion fails.

Converted Text

Text is converted properly when your display is set to 96 DPI. If your display is set to 120 DPI, then the converted file might contain text that wraps onto more than one line.

Disabled Regions

In legacy files a disabled region is marked with a black square. When converted, the disabled region appears grayed out.

Previous versions of Mathcad	PTC Mathcad Prime 3.1
D := "Disabled Legacy Math Region" ■	$D :=$ "Disabled Legacy Math Region"

Areas

Collapsed areas are supported in PTC Mathcad Prime 3.1. However, you cannot lock areas in PTC Mathcad Prime 3.1. If the legacy file contains a locked area that is collapsed, the conversion fails. Expanded locked areas and unlocked areas are converted directly to PTC Mathcad Prime 3.1 areas.

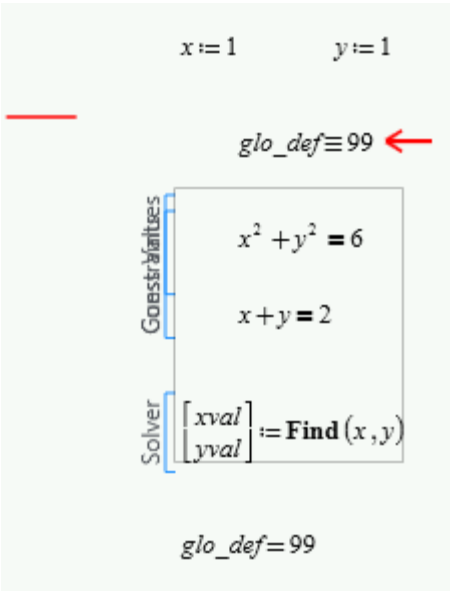
Page Layout

You can view the PTC Mathcad Prime 3.1 worksheet with or without grid lines. By default PTC Mathcad Prime 3.1 opens in page view in which your worksheet appears as a series of pages with grid lines. The nonprintable continuous space that is visible on the right side of the legacy Mathcad worksheets is hidden. To view the nonprintable space, click the **Draft View** icon  in the bottom right of the status bar or under the **Document** tab. To view a print preview of your worksheet, click the **Page View** icon  . If you want to make your page view larger, choose a different page size or adjust the margins under the **Document** tab. You can also preview your pages by saving them to XPS (XML Paper Specification) or printing them to PDF directly from PTC Mathcad Prime 3.1.

Global Definition Operator

Legacy Mathcad allows the use of multiple global definitions of the same variable, including inside solve blocks. PTC Mathcad Prime 3.1 limits you to a single global definition of the same variable and it must be placed outside solve blocks.

- If your legacy worksheet has a global definition operator inside a solve block, then upon conversion the global definition operator is moved to outside the solve block.

Previous versions of Mathcad	PTC Mathcad Prime 3.1
x := 1 y := 1 Given glo_def ≡ 99 $x^2 + y^2 = 6$ x + y = 2 $\begin{pmatrix} xval \\ yval \end{pmatrix} := Find(x,y)$ glo_def = 99	

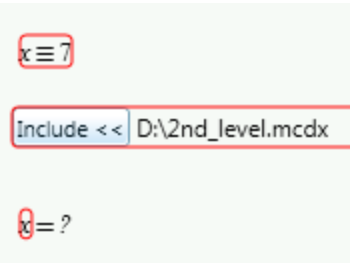
The converted worksheet has no errors. Read the annotation message before clearing it.

- If your legacy worksheet has multiple global definitions of the same variable, then opening the converted file shows no errors. However, if you recalculate the worksheet, then the two global definitions and their two evaluations report errors.

Previous versions of Mathcad	PTC Mathcad Prime 3.1	
x ≡ 3 x = 3 x ≡ 5 x = 5	x ≡ 3 x = 3 x ≡ 5 x = 5	x ≡ 3 x = ? x ≡ 5 x = ?

The converted worksheet has errors. Resolve the issue by removing the extra global definition operators.

- If your legacy worksheet contains a global definition of a variable and a reference to another worksheet that contains a global definition of the same variable, then upon conversion and recalculation an error is flagged by all regions.

Previous versions of Mathcad	PTC Mathcad Prime 3.1
x ≡ 7 Reference:D:\2nd_level.xmcd(R) x = 3	

The converted worksheet has errors. To resolve the issue you must open the included worksheet to decide which of the global definition operators you should remove.

Calculation Differences

TOL and CTOL

PTC Mathcad Prime 3.1 uses the *KNITRO* optimization solvers. This means that tolerances for solve block functions **find**, **minerr**, **minimize** and **maximize** are set internally. Unlike previous versions of Mathcad, you no longer need to set *TOL* in a solve block.

Note

With PTC Mathcad Prime 3.1 the *KNITRO* optimization solver sets the tolerances internally when you use functions **minimize** and **maximize** outside a solve block.

CTOL continues to control the constraint satisfaction tolerance for functions **find** and **minerr**.

Clearing the Previous Value of a Variable

In previous versions of Mathcad, the expression $x:=x$ was used to clear the previous symbolic value of x while leaving the numeric value intact. The **XMCD, MCD Converter** converts the legacy expression $x:=x$ to the new PTC Mathcad Prime 3.1 function $\mathbf{clear_{sym}(x)}$.

Units

PTC Mathcad Prime 3.1 has dynamic unit checking. This means that units are checked while functions are processed. In Mathcad 12 through 15, units are checked first and then processed.

Previous versions of Mathcad	PTC Mathcad Prime 3.1
f(x) := 1 + m f(1) =	$f(x) := 1 + m$ $f(1) = ?$
An error on the function definition indicates that the units do not match.	An error only appears after the function is evaluated.

Dynamic checking gives more flexibility, so some expressions that produce an error in earlier versions of Mathcad work properly in PTC Mathcad Prime 3.1. For example, in Mathcad 12 through 15, you cannot define a program or function that depends on a numeric value to determine the units of output.

$$f2(x) := \begin{cases} cm^2 & \text{if } x < 0 \\ cm^3 & \text{otherwise} \end{cases}$$

But in PTC Mathcad Prime 3.1, the program works as expected:

$$f2(x) := \text{if } x < 0 \;\; \| \, cm^2 \;\; \text{else} \;\; \| \, cm^3$$

Note

This program contains the if/else operator, which replaces if/otherwise.

Solve Blocks

Solve blocks in PTC Mathcad Prime 3.1 are clearly defined regions within a solve block box. You do not need the word *Given* to mark the start of a solve block. Guess values, constraints, and solvers are labeled for clarity. All regions inside the solve block construct can move as one unit. For more information on solve blocks, refer to the Help and the Solving Tutorial for PTC Mathcad Prime 3.1.

The following restrictions apply to solve blocks:

- You cannot use a global definition operator inside a solve block.
- You cannot include a range loop above the solver function inside a solve block. You can have a range variable but not a range loop such as this:

$$i := 1 .. 10$$

$$x_i := i$$

- You cannot include any definitions inside an ODE solve block, that is, a solve block containing **odesolve**.
- PTC Mathcad Prime 3.1 does not support symbolic evaluation of functions inside solve blocks. If your legacy worksheet contains symbolic evaluations then upon conversion they are moved outside the solve block.

Worksheet Calculation

Earlier versions of Mathcad open by recalculating all results, and you can choose to save the file with results stored or unstored.

PTC Mathcad Prime 3.1 does not recalculate the results when you first open the file, so if results were stored, they will show in the file. When you edit a file, the results are recalculated. When you edit results, the results are always recalculated.

Other Notable Differences

DOE Functions

- In PTC Mathcad Prime 3.1, the ordering in the **fullfact**, **fractfact** and **boxwilson** functions is based on *The National Institute of Standards and Technology (NIST)* standard. In previous versions of Mathcad, the ordering is based on *Understanding Industrial Designed Experiments/Book and Disk-Excel [Hardcover]* by Stephen R. Schmidt and Robert G. Launsby.
- In PTC Mathcad Prime 3.1, the result of **boxwilson** is displayed as a matrix, whereas in previous versions of Mathcad it is displayed as a table. The accuracy of the result is not affected.

Previous Versions of Mathcad

$$\text{fullfact}(2) = \begin{pmatrix} \text{"Run"} & \text{"Block"} & \text{"A"} & \text{"B"} \\ 1 & 1 & -1 & -1 \\ 2 & 1 & -1 & 1 \\ 3 & 1 & 1 & -1 \\ 4 & 1 & 1 & 1 \end{pmatrix}$$

PTC Mathcad Prime 3.1

$$\text{fullfact}(2) = \begin{bmatrix} \text{“Run”} & \text{“Block”} & \text{“A”} & \text{“B”} \\ 1 & 1 & -1 & -1 \\ 2 & 1 & 1 & -1 \\ 3 & 1 & -1 & 1 \\ 4 & 1 & 1 & 1 \end{bmatrix}$$

Previous Versions of Mathcad

$$\text{fractfact}(3,1) = \begin{pmatrix} \text{"Run"} & \text{"Block"} & \text{"A"} & \text{"B"} & \text{"C=AB"} \\ 1 & 1 & -1 & -1 & 1 \\ 2 & 1 & -1 & 1 & -1 \\ 3 & 1 & 1 & -1 & -1 \\ 4 & 1 & 1 & 1 & 1 \end{pmatrix}$$

PTC Mathcad Prime 3.1

$$\text{fractfact}(3,1) = \begin{bmatrix} \text{“Run”} & \text{“Block”} & \text{“A”} & \text{“B”} & \text{“C=AB”} \\ 1 & 1 & -1 & -1 & 1 \\ 2 & 1 & 1 & -1 & -1 \\ 3 & 1 & -1 & 1 & -1 \\ 4 & 1 & 1 & 1 & 1 \end{bmatrix}$$

Previous Versions of Mathcad

boxwilson(2) =

	0	1	2	3
0	"Run"	"Block"	"A"	"B"
1	1	1	-1	-1
2	2	1	-1	1
3	3	1	1	-1
4	4	1	1	1
5	5	1	0	0
6	6	1	0	0
7	7	1	0	0
8	8	1	0	0
9	9	1	0	0
10	10	1	1.414	0
11	11	1	-1.414	0
12	12	1	0	1.414
13	13	1	0	-1.414

PTC Mathcad Prime 3.1
$\text{boxwilson}(2) = \begin{bmatrix} \text{“Run”} & \text{“Block”} & \text{“A”} & \text{“B”} \\ 1 & 1 & -1 & -1 \\ 2 & 1 & 1 & -1 \\ 3 & 1 & -1 & 1 \\ 4 & 1 & 1 & 1 \\ 5 & 1 & 0 & 0 \\ 6 & 1 & 0 & 0 \\ 7 & 1 & 0 & 0 \\ 8 & 1 & 0 & 0 \\ 9 & 1 & 0 & 0 \\ 10 & 1 & 1.414 & 0 \\ 11 & 1 & -1.414 & 0 \\ & & & \vdots \end{bmatrix}$

Greek Letters in Text Regions

To insert a Greek letter inside a PTC Mathcad Prime 3.1 text region, first type the equivalent Latin character, then select the typed letter and change its font to **Symbol**. Alternatively, insert the character from the Character Map program under Accessories.

You can also copy a variable name containing Greek symbols from a math region to a text region.

Apostrophe and First Derivative Operator in Math Regions

To insert an apostrophe inside a PTC Mathcad Prime 3.1 math region, simply type ‘ (apostrophe). To insert the first derivative (prime operator), type Ctrl+’.

Previous Versions of Mathcad	PTC Mathcad Prime 3.1
$f(x) := x + 1$ Insert an apostrophe by pressing the ` (back quote).	$f'(x) := x + 1$ Insert an apostrophe by pressing the ‘ (apostrophe).

Images

PTC Mathcad Prime 3.1 does not have a Picture tool. To display an image that results from processing an input image, save the new image to the current working directory and on the **Math** or **Document** tab, in the **Regions** group, click **Image**. Click **Browse for Image...** to locate and insert your image.

2

Resolving Conversion Issues

When you convert a legacy worksheet to PTC Mathcad Prime 3.1 format, the converted file may contain visual or calculation issues that require your intervention. Use the information in this chapter to learn how to resolve file conversion issues.

Region Placement

The worksheet conversion process may result in some regions overlapping other regions. This can be caused by one or more of the following reasons:

- Difference in page size
- Difference in font size and style
- Little or no space between regions in the legacy worksheet
- Excel component display differences
- Matrix display differences

Resolution

Click near the top of the page in the PTC Mathcad Prime 3.1 worksheet. On the **Document** tab, in the **Spacing** group, click **Separate Regions** and then select **Vertically** or **Horizontally**.

Worksheet Calculation

The worksheet conversion process might run into math regions that it cannot resolve or plot regions that it cannot convert. The converter turns such regions into images with appropriate annotations so none of your original content is lost.

Note

The converter cannot process legacy files that contain collapsed, locked areas. Unlock or expand such areas before converting them.

Numeral Zero

Converting legacy worksheets that contain expressions with units, such as *0/1s + 2m/1s*, that ran error free might yield an error in PTC Mathcad Prime 3.1.

This is because to implement dynamic unit checking (*DUC*) in a more flexible manner, PTC Mathcad Prime 3.1 must assume that the *0* in *0/1s* is unitless and therefore *0/1s* has dimension *1/time* (for example, frequency). Therefore adding frequency *0/1s* to velocity *2m/1s* will correctly result in an error because the units are not compatible.

To resolve this error, replace the unitless *0* with a zero of dimension *m* to indicate that it represents length. Thus, *0m/1s + 2m/1s = 2 m/s* as expected.

Note

To provide more control over how numeral 0 should behave, PTC Mathcad Prime 3.1 provides two built-in constants:

- *zero* (lowercase) — Represents dimension less 0. For example, *zero + 1m* yields an error whereas *0 + 1m = 1m*

  Use variable *zero* to ensure that the quantity is always checked for correct dimension, even when it has a magnitude of 0.
- *Zero* (uppercase) — Represents 0 of any quantity. It assumes whatever unit is required by the computation. For example, *Zero*m + Zero*s = 0*

  Use variable *Zero* to simulate compatibility with legacy Mathcad treatment.

It is recommended that you always specify the desired unit with every magnitude in mixed unit expressions.

Built-In Variables

When your legacy worksheet contains a built-in variable whose value is defined on the **Calculation** tab, in the **Worksheet Settings** group, you must define that variable at the top of your converted worksheet. For example, if the value of *ORIGIN* in your legacy worksheet is 2, you type *ORIGIN:=2* at the top of your converted worksheet.

Result Formatting

Result formatting differences do not affect the accuracy of results, but some results may look different in your converted worksheet because the following options are different in PTC Mathcad Prime 3.1:

- Results formatting: Complex threshold, zero threshold, exponential threshold, fraction, exponents in engineering format, format units, hexadecimal, octal or binary display.
- Show unit exponents as a fraction
- Display precision: PTC Mathcad Prime 3.1 supports display precision of up to 15 decimal places.
- Matrix display style

Note

When you open a worksheet in PTC Mathcad Prime 3.1, the results are not recalculated automatically. You must press Ctrl+F5 to recalculate the worksheet and view the actual results in PTC Mathcad Prime 3.1.

Functions

lu, qr, and cholesky Matrix Decomposition Functions

The legacy **lu**, **qr**, and **cholesky** matrix decomposition, or factorization, functions have been replaced with **LU**, **QR**, and **Cholesky**, respectively. The new case sensitive functions offer enhanced capability in terms of performance and stability, full pivoting and complex support, and no limitation of input matrix dimensions.

The following table highlights the differences between the two groups of functions:

Note

Similar names are used for the output matrices of the legacy functions and their new counterparts, but the form or contents of such matrices are not necessarily similar or equal. Apply a legacy function and its counterpart to the same input matrix and observe the differences in the resulting outputs.

	Previous versions of Mathcad	PTC Mathcad Prime 3.1
Syntax	**lu(M)**	**LU(M)**
Input matrix	Real or complex square matrix	Real or complex mxn matrix
Return array	Three augmented square matrices —*P*, *L*, and *U*	A vector containing three nested matrices—*P*, *L*, *U*
Equation	$P . M = L . U$	$P . M = L . U$
Syntax	**qr(M)**	**QR(M,[p])**
Input matrix	Real mxn matrix	Real or complex mxn matrix
Return array	Two augmented matrices—Q and R	A vector containing three nested matrices—*P*, *Q*, *R*
Equation	$M = Q . R$	$M . P = Q . R$
Syntax	**cholesky(M)**	**Cholesky(M,[p,[u]])**

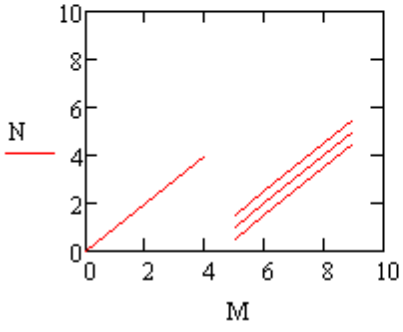
	Previous versions of Mathcad	PTC Mathcad Prime 3.1
Input matrix	Real positive definite square matrix. (assumed to be symmetric)	Real positive definite square matrix Or: Complex Hermitian definite square matrix
Return array	One square matrix—L	A vector containing two nested matrices—P, L
Equation	$M = L \cdot L^T$	$P^T \cdot M \cdot P = L \cdot L^T$

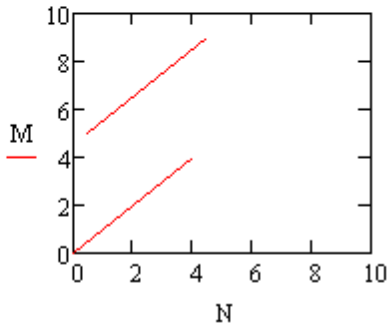
2D Plots

Waterfall Plot

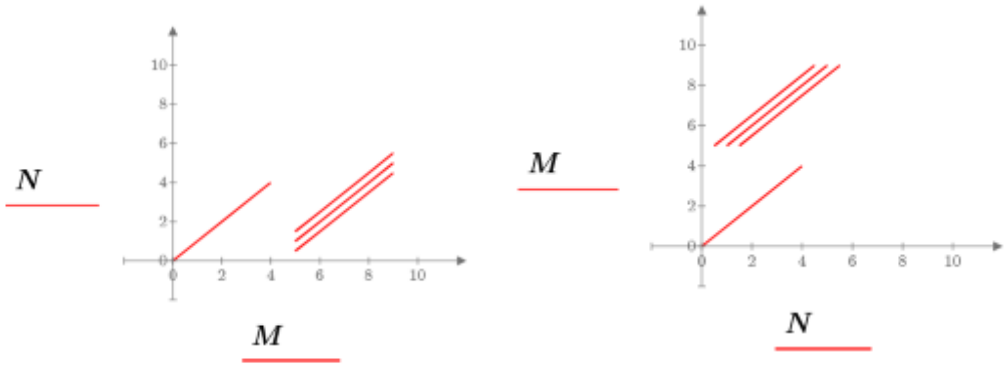
When the y-axis is a matrix of multiple columns, legacy Mathcad plots one trace per column:

$$M := \begin{pmatrix} 0 & 5 \\ 1 & 6 \\ 2 & 7 \\ 3 & 8 \\ 4 & 9 \end{pmatrix} \qquad N := \begin{pmatrix} 0 & 0.5 & 1 & 1.5 \\ 1 & 1.5 & 2 & 2.5 \\ 2 & 2.5 & 3 & 3.5 \\ 3 & 3.5 & 4 & 4.5 \\ 4 & 4.5 & 5 & 5.5 \end{pmatrix}$$





After you convert the worksheet and perform the actions below, PTC Mathcad Prime 3.1 displays the plot as follows:

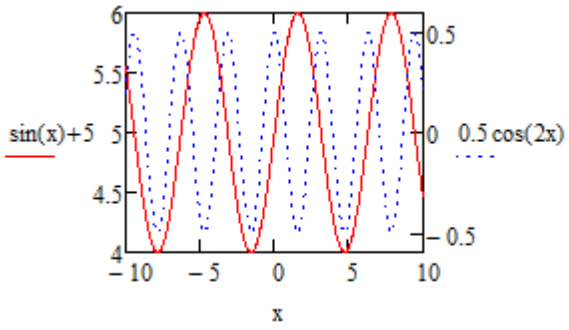


Perform one of the following actions:

- XY plot—When the number of columns of x is greater than y (as in the plot on the right), a trace is plotted for each column in the x axis expression. You must delete the extra columns in x if you want this plot to look exactly as the legacy plot.
- Polar plot—Plot the columns one at a time with one y-axis expression per vector.

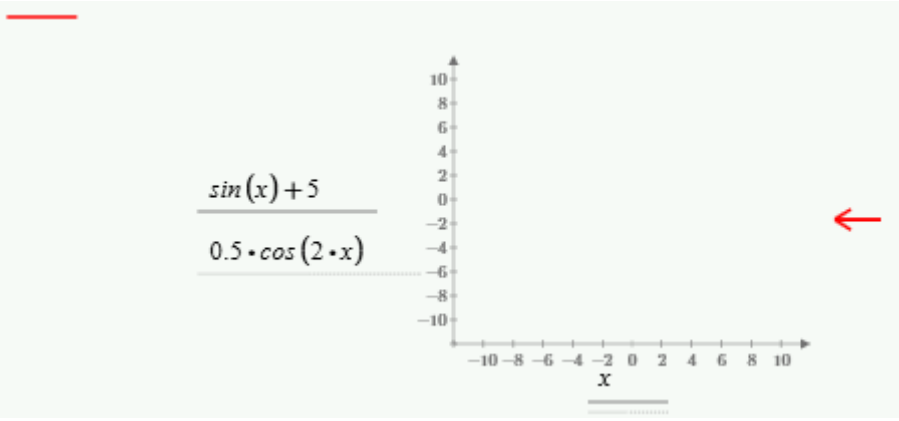
Secondary Y Axis

When your legacy plot contains a secondary y-axis, the plot is converted as follows — assuming the tick marks of the first y-axis were user-defined:

Legacy Plot


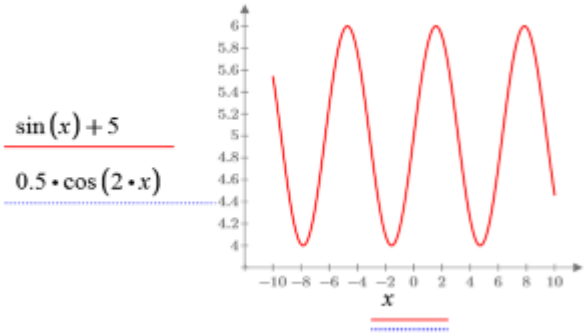
Opening the converted file shows an annotated plot but no traces. The annotation message explains that the secondary y-axis is not supported in the current version of PTC Mathcad Prime, and that all traces have been converted to the primary y-axis.

After Conversion



To resolve the issue, do the following:

1. Clear the annotation.



   Only the primary trace is visible. The secondary trace is not visible because the range of the primary axis is *4–6* while the range of the secondary axis is *–0.5–0.5*.

2. Define the maximum and minimum of the two traces:

$$f1(x) := \sin(x) + 5 \qquad f2(x) := 0.5 \cdot \cos(2 \cdot x)$$

$$f1Max := 6 \qquad f2Max := 0.5$$

$$f1Min := 4 \qquad f2Min := -0.5$$

3. Scale the missing trace as follows:

$$y(x) := \left(\frac{f1Max - f1Min}{f2Max - f2Min}\right) \cdot (0.5 \cdot \cos(2\ x)) + \left(f1Min - \left(\frac{f1Max - f1Min}{f2Max - f2Min}\right) \cdot f2Min\right)$$

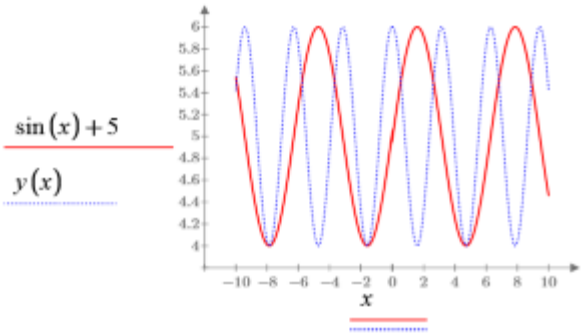
Note

You can use the above scaling formula for plots with a normal scale, but not for plots with a logarithmic scale.

4. Evaluate *y(x)* symbolically to see the symbolic result of the scaling.

$$y(x) \rightarrow 1.0 \cdot \cos(2 \cdot x) + 5.0$$

5. Plot the original function and the newly scaled one.



The two traces now appear as they do in the legacy plot.

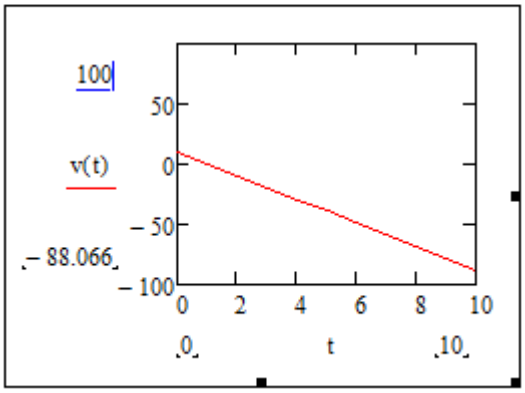
Plots with Units

PTC Mathcad 15.0 does not fully support units in plots. You can place values with units in plotted expressions, limits, and markers, but Mathcad does not perform unit checking. Mathcad uses the magnitude of values converted by default to SI units, or to the unit system you set for the worksheet.

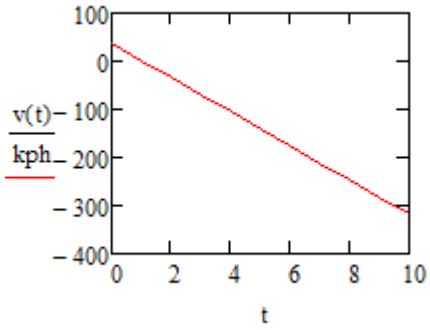
$t := 0s, 1s .. 10s \qquad v_0 := 10\frac{m}{s}$

$v(t) := v_0 - g \cdot t$

$v(2s) = -9.613\frac{m}{s}$

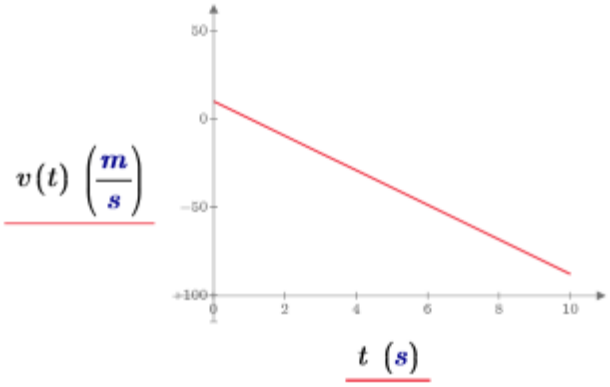


If you wish to scale the y-axis of the PTC Mathcad 15.0 plot and view velocity in terms of kilometer per hour, you must divide the plotted function *v(t)* by *kph*:

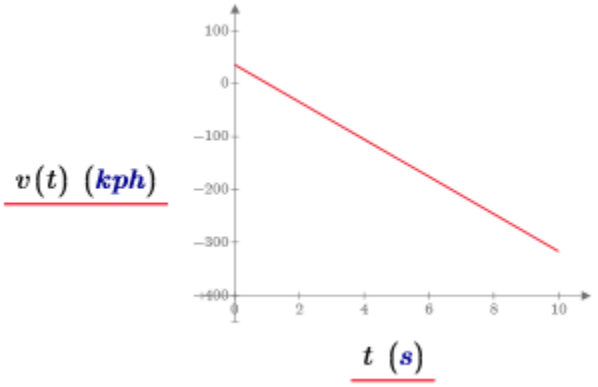


With PTC Mathcad Prime 3.1, you can plot functions and data with units, and Mathcad scales the axes values appropriately.

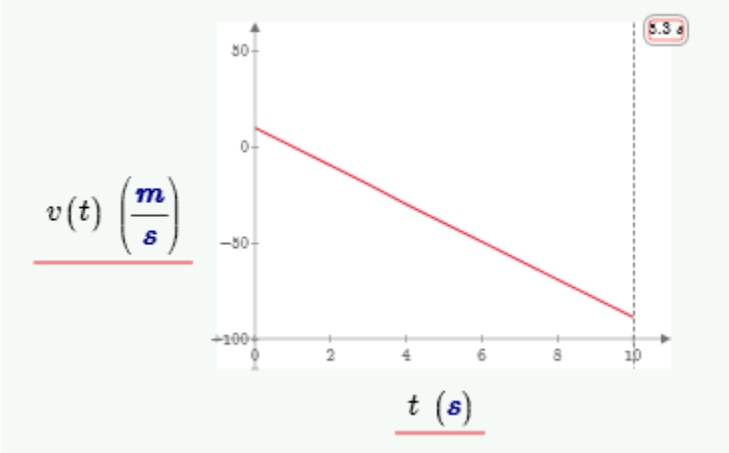
Type the vertical and horizontal expressions *v(t)* and *t* and Mathcad inserts the units into the unit placeholders automatically.

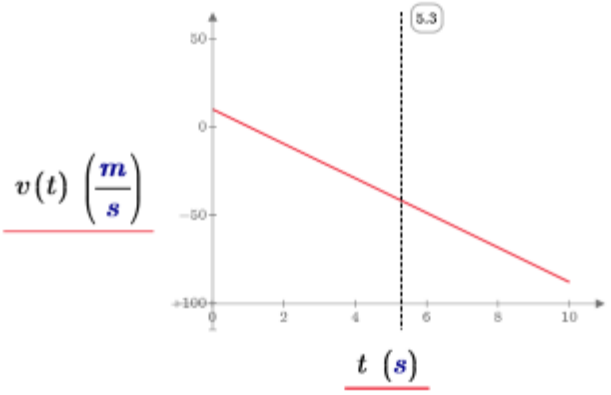


To view velocity in terms of kilometer per hour, select the unit placeholder and type *kph*.



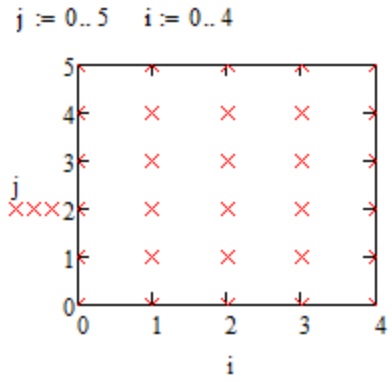
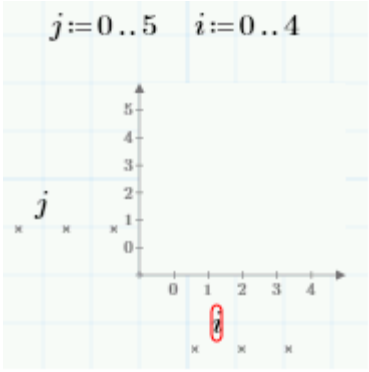
If your legacy plot contains markers or tick marks with units, after conversion you must remove the unit to clear the error.





Plotting Two Range Variables

When your legacy worksheet contains a plot with two range variables, the conversion result is as follows:

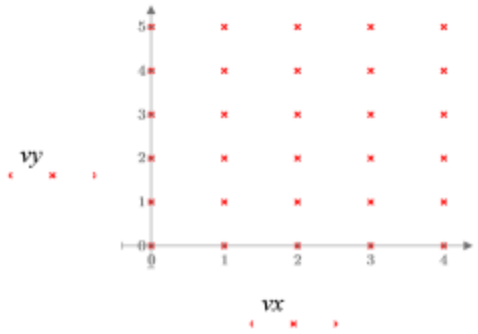
Legacy Plot	After Conversion
	

To resolve the issue, define vectors *vx* and *vy* above the converted plot:

$$vx := \left\| \begin{array}{l} \text{for } j \in 0..5 \\ \quad \left\| \begin{array}{l} \text{for } i \in 0..4 \\ \quad \left\| vx_{j,i} \leftarrow i \right. \end{array} \right. \\ vx \end{array} \right.$$

$$vy := \left\| \begin{array}{l} \text{for } j \in 0..5 \\ \quad \left\| vy_{j} \leftarrow j \right. \\ vy \end{array} \right.$$

Replace *j* and *i* in the plot with *vy* and *vx*.



Note

This solution only applies to XY plots.

3D Plots

In previous versions of Mathcad, you can insert various types of 3D plots in your worksheet. In PTC Mathcad Prime 3.1, scattered data, curves, and surfaces are converted to a single type of 3D plot.

Mathcad converts the tick mark values according to their settings in the legacy plot. When the plot displays a function, the converter calls **CreateMesh** or **CreateSpace** to capture its original ranges, including its start and end points, as well as its number of intervals.

After you open the converted file in PTC Mathcad Prime 3.1, you do not need to keep the call to **CreateMesh** or **CreateSpace**. You can obtain an identical looking plot by typing the function name directly in the axis expression and then by editing the tick mark values, by editing the number of grids points, or by defining range variables above the plot.

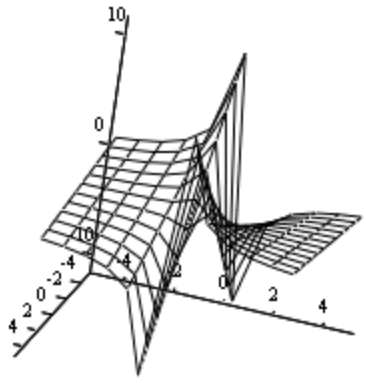
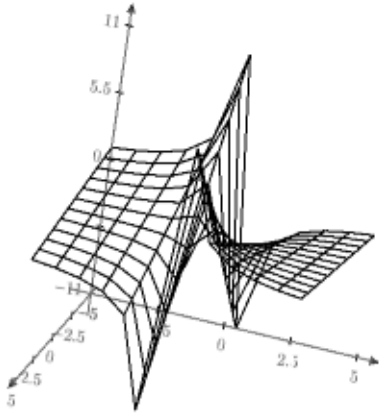
Functions of Two Arguments with Default Starts and Ends

When a legacy plot displays a function of two arguments with default starts (-5) and ends (5), the converter does not need to add arguments to **CreateMesh** or **CreateSpace** to define the lower and upper bounds of the plotted range.

In previous versions of Mathcad, the number of plotted points is defined as the number of grids (or intervals). However, in **CreateMesh**, the number of plotted points is defined as the number of grid points. The converter must add +1 to the number of intervals to preserve the original plotted range.

Note

The default plotted range in PTC Mathcad Prime 3.1 is (-10, 10). When changing the **Number of Points** on the Ribbon, you are changing the number of grid points and not the number of intervals.

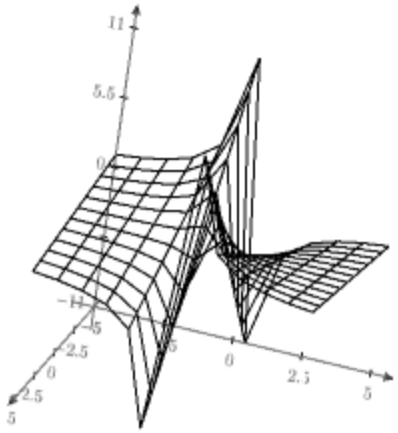
Previous versions of Mathcad	PTC Mathcad Prime 3.1
A function of 2 arguments with 5 intervals in the x- and y-direction. The intervals are defined in the **Properties** dialog box under the **QuickPlot** tab.	After conversion, the plot displays **CreateMesh** with 12 points in the x- and y-direction.
$f(x,y) := \frac{x}{y}$  f	$f(x,y) := \frac{x}{y}$  CreateMesh $(f, 12)$

In this example, due to the singularity at (0, 0), the function can only be plotted with an odd number of intervals as seen in previous Mathcad versions, or with even number of points as seen with **CreateMesh** in PTC Mathcad Prime 3.1.

After conversion, you may want to remove **CreateMesh**. For the example above, you can proceed as follows:

> **Note**
>
> In this particular case, plotting the function returns an error due to the singularity at (0,0). To fix this, replace the division operator with a multiplication operator and go through step 2 before changing back the operator to division.

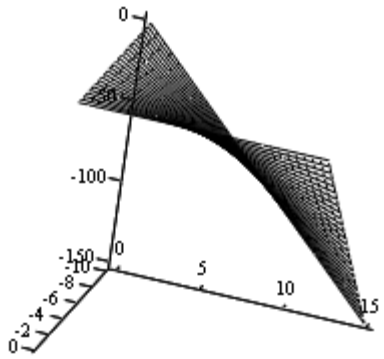
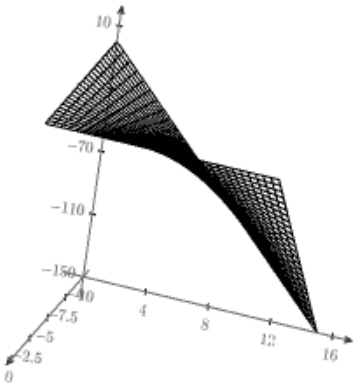
1. In the z-axis expression, replace *CreateMesh(f, 12)* with *f*.
2. On the **Plots** tab, in the **Traces** group, change the **Number of Points** to 12.
3. Edit the minimum and maximum tick mark values of x-axis and y-axis to -5 and 5.



f

Functions of Two Arguments with User-Defined Starts, Ends, and Number of Intervals

When a legacy plot displays a function of two arguments with user-defined starts and ends or number of intervals, the converter adds arguments to **CreateMesh** or **CreateSpace** to define the lower and upper bounds of the plotted range and number of grid points.

Previous versions of Mathcad	PTC Mathcad Prime 3.1
A function of 2 arguments with 25 intervals in the x-direction and 30 intervals in the y-direction. The plotted range of x is (-10, 0) and the plotted range of y is (0, 15). The intervals are defined in the **Properties** dialog box under the **QuickPlot** tab.	After conversion, the plot displays **CreateMesh** with the corresponding plotted ranged. There are 26 points in the x-direction and 31 points in y-direction.
$f(x,y) := x \cdot y$  f	$f(x,y) := x \cdot y$  $\text{CreateMesh}(f,-10,0,0,15,26,31)$

After conversion, you can replace *CreateMesh(f, s0, s1, t0, t1, sgrid, tgrid)* with *f(x,y)* where *x* and *y* are defined as range variables above the plot:

1. Calculate the step sizes x_s and y_s using the following equations:

$$s0 := -10 \qquad s1 := 0 \qquad sgrid := 26$$

$$t0 := 0 \qquad t1 := 15 \qquad tgrid := 31$$

$$x_s := s0 + \frac{s1 - s0}{sgrid - 1} = -9.6$$

$$y_s := t0 + \frac{t1 - t0}{tgrid - 1} = 0.5$$

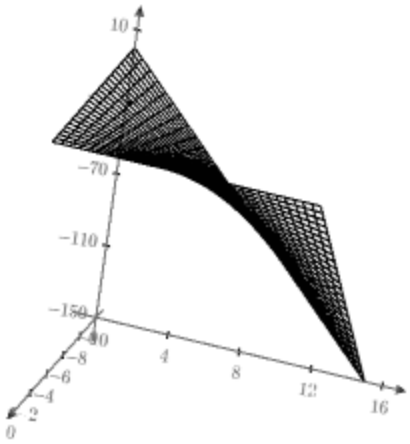
2. Define *x* and *y* as range variables.

$x := s0, x_s .. s1$

$y := t0, y_s .. t1$

3. In the z-axis expression, replace *CreateMesh(f, -10 ,0, 0, 15, 26, 31)* with *f(x,y)*.

$f(x, y) := x \cdot y$

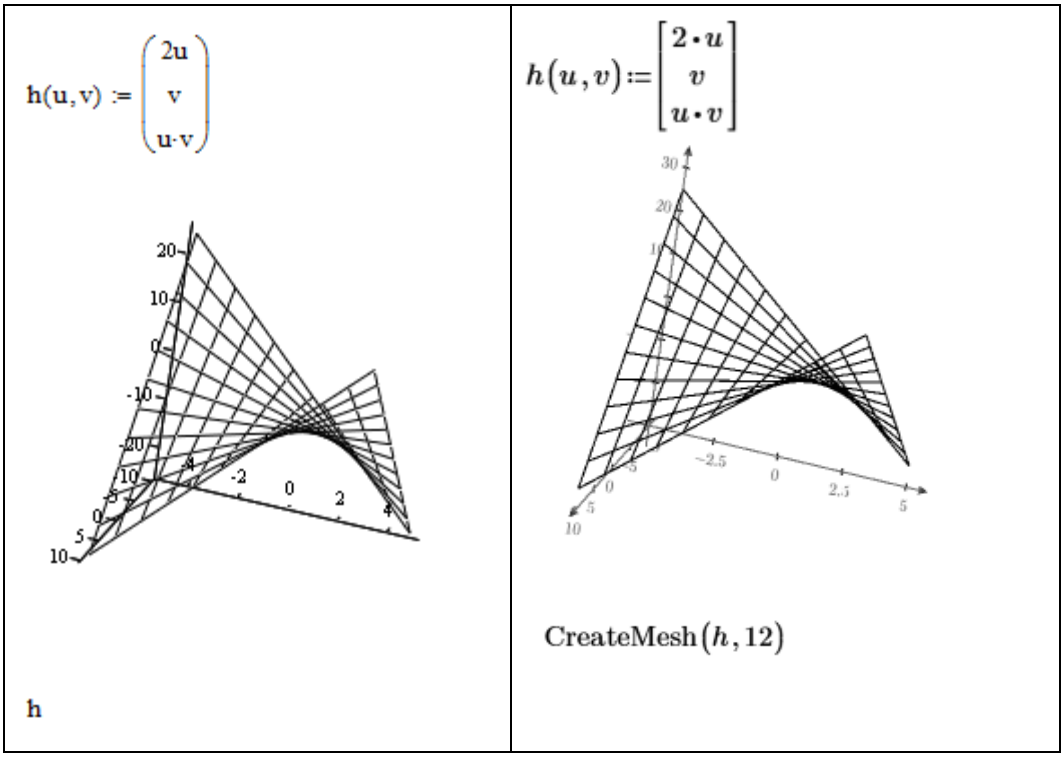


$f(x, y)$

Vector-Valued Functions

Vector-valued functions in legacy plots are converted the same way as functions of two arguments. The plotted range is captured by the arguments of **CreateMesh** or **CreateSpace**.

Previous versions of Mathcad	PTC Mathcad Prime 3.1
A function defining a parametric surface with 11 intervals. The plotted ranges of x and y are (-5, 5).	Mathcad uses **CreateMesh** to plot the function after conversion, with the corresponding range and grid points.



To remove the call to **CreateMesh**, use the same procedure as described in the previous section where range variables are defined above the plot.

1. Calculate the step size:

$$u0 := -5 \qquad u1 := 5 \qquad grid := 12$$

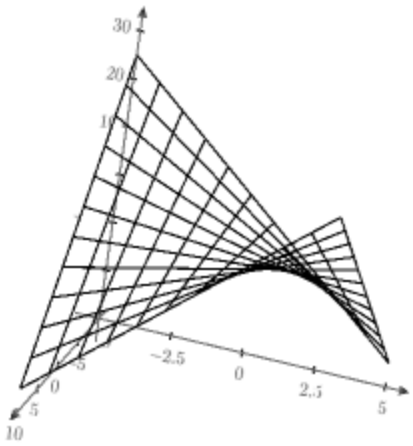
$$u_s := u0 + \frac{u1 - u0}{grid - 1}$$

2. Define the range variables:

$$u := u0, u_s .. u1$$

$$v := u$$

3. Replace *CreateMesh(h,12)* with *h(u,v)*.



$h(u, v)$

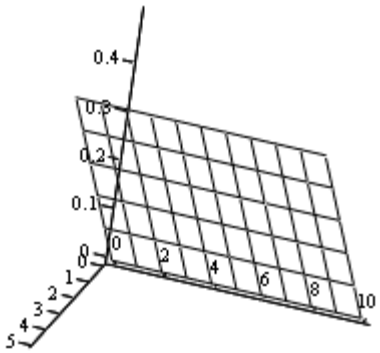
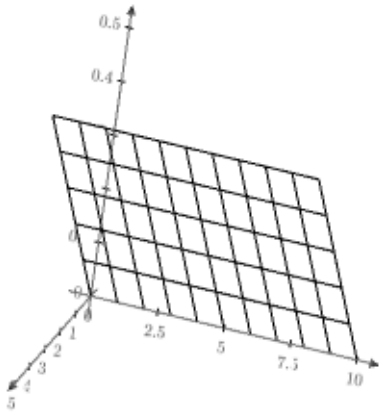
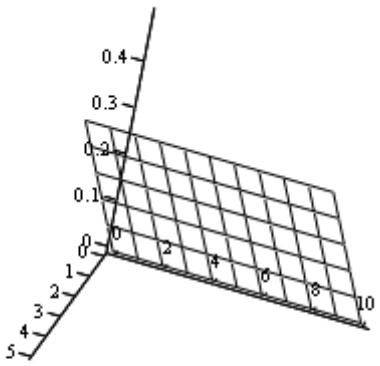
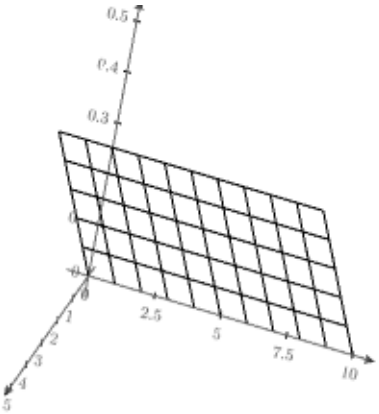
Combined Inputs

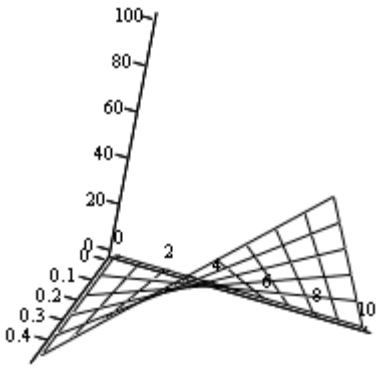
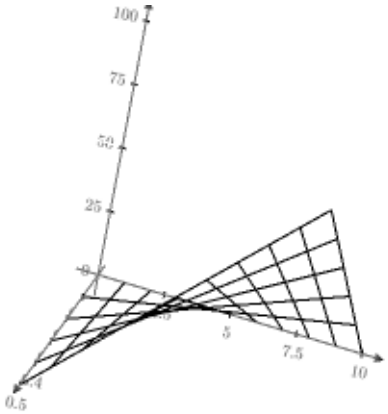
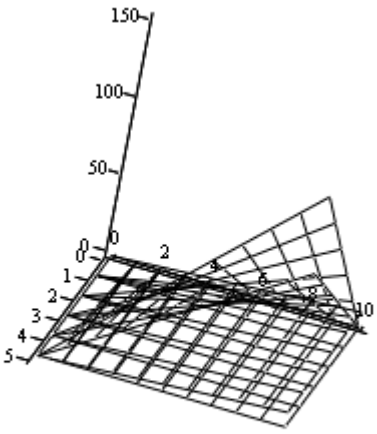
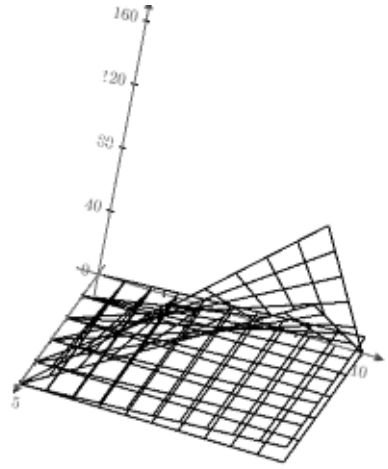
In previous versions of Mathcad, you can combine inputs with parentheses or vectors, instead of defining inputs one by one, separated by commas, as is done in 2D plots. In PTC Mathcad Prime 3.1, you must define each input in a separate z-axis expression. Mathcad converts combined inputs in such a way as to preserve the look of the converted plot as close as possible to the legacy plot.

For example, given the following combined input, the conversion works as shown below.

$i := 0..5 \qquad j := 0..10$

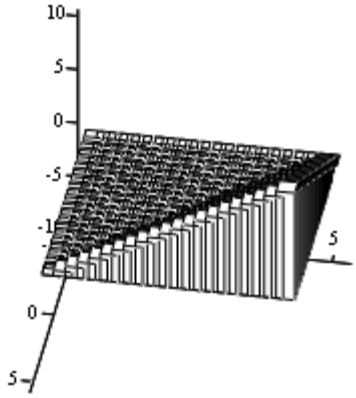
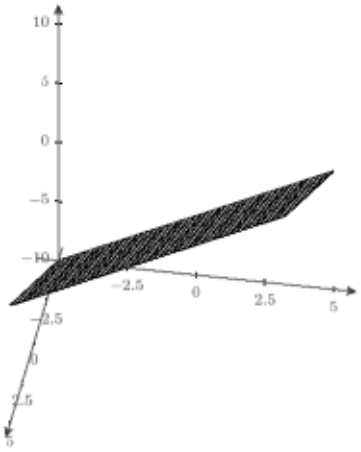
$M_{i,j} := 0.1 \cdot i \qquad N_{i,j} := j \qquad P_{i,j} := 2 \cdot i \cdot j \qquad Q_{i,j} := 3 \cdot i \cdot j$

Previous versions of Mathcad	PTC Mathcad Prime 3.1
 (M)	 *M*
 (M,N)	 *M*

Previous versions of Mathcad	PTC Mathcad Prime 3.1
 (M,N,P)	 $\begin{bmatrix} M \\ N \\ P \end{bmatrix}$
 (M,N,P,Q)	 M N P Q

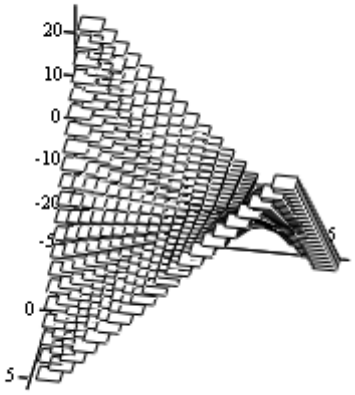
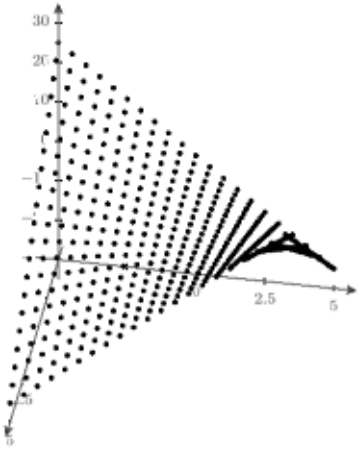
Bar Plots

Bar plots are not supported in PTC Mathcad Prime 3.1. They are converted to surface plots.

Previous versions of Mathcad	PTC Mathcad Prime 3.1
$f(x,y) := x + y$  f	$f(x,y) := x+y$  $\text{CreateMesh}(f, 21)$

Patch Plots

Patch plots are not supported in PTC Mathcad Prime 3.1. They are converted to 3D Scatter plots.

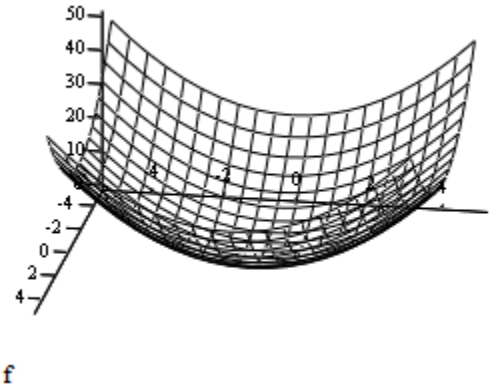
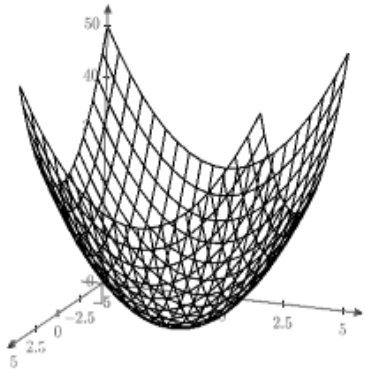
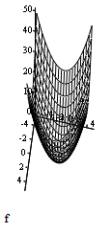
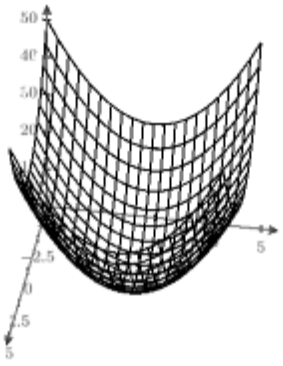
Previous versions of Mathcad	PTC Mathcad Prime 3.1
$f(x,y) := x \cdot y$  f	$f(x,y) := x \cdot y$  $\text{CreateMesh}(f, 21)$

Cylindrical and Spherical Coordinate System Plots

In previous versions of Mathcad you can plot data in a cylindrical or a spherical coordinate system. PTC Mathcad Prime 3.1 converts a cylindrical or a spherical coordinate system plot to an image.

3D Plots Size

When you convert a legacy worksheet that contains a wide or a narrow plot, the converter resets the plot to a cube.

Previous versions of Mathcad	PTC Mathcad Prime 3.1
	
	

Contour Plots

With contour plots you can view 3D data in a 2D plot. Each contour represents a z value.

The contour function supports a number of input data formats. One such format is a vector of three nested matrices, $[X\ Y\ Z]^T$, representing the x-, y-, and z-coordinates.

The conversion of a legacy contour plot into a PTC Mathcad Prime contour plot fails if the input data format is a vector of three matrices and coordinate matrix *X* or *Y* is not rectangular. In some cases, the conversion succeeds even in the presence of a non-rectangular matrix, but the resulting plot is different than the plot in the legacy worksheet.

For matrix *X* to be rectangular, all values in a single row must be the same, and values in row *R* must be larger than values in row *R-1*:

$$X = \begin{bmatrix} -5 & -5 & -5 & -5 & -5 & -5 & \\ -4.474 & -4.474 & -4.474 & -4.474 & -4.474 & -4.474 & \\ -3.947 & -3.947 & -3.947 & -3.947 & -3.947 & -3.947 & \\ -3.421 & -3.421 & -3.421 & -3.421 & -3.421 & -3.421 & \\ -2.895 & -2.895 & -2.895 & -2.895 & -2.895 & -2.895 & \\ -2.368 & -2.368 & -2.368 & -2.368 & -2.368 & -2.368 & \\ & & & & & & \ddots \end{bmatrix}$$

Similarly, for matrix *Y* to be rectangular, all values in a single column must be the same, and values in column *C* must be larger than values in column *C-1*:

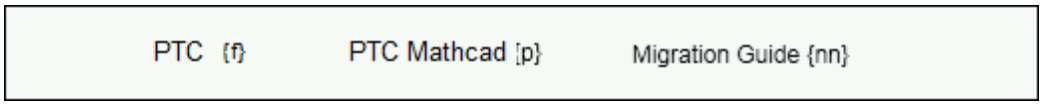
$$Y = \begin{bmatrix} -5 & -4.474 & -3.947 & -3.421 & -2.895 & -2.368 & \\ -5 & -4.474 & -3.947 & -3.421 & -2.895 & -2.368 & \\ -5 & -4.474 & -3.947 & -3.421 & -2.895 & -2.368 & \\ -5 & -4.474 & -3.947 & -3.421 & -2.895 & -2.368 & \\ -5 & -4.474 & -3.947 & -3.421 & -2.895 & -2.368 & \\ -5 & -4.474 & -3.947 & -3.421 & -2.895 & -2.368 & \\ & & & & & & \ddots \end{bmatrix}$$

Headers and Footers

Legacy worksheet header:

PTC {f}	PTC Mathcad {p}	Migration Guide {nn}

Conversion output:



The following table outlines the legacy header and footer syntax and the equivalent command on the PTC Mathcad Prime 3.1 **Document** tab, in the **Headers and Footers** group. Use the table to replace the legacy syntax character with the equivalent PTC Mathcad Prime 3.1 header or footer field.

Legacy Syntax	Description	PTC Mathcad Prime 3.1 Command
{f}	Insert file name	**File ▸ Name**
{p}	Insert file path	**File ▸ Path**
{n}	Insert page number	**Page Number** with choices
{nn}	Insert number of pages	**Page Number** with choices
{fd}	Insert date last saved	**Saved Date**
{ft}	Insert time last saved	Not available
{d}	Insert current date	Not available
{t}	Insert current time	Not available

The following header and footer customization options are not available in PTC Mathcad Prime 3.1:

- Changing the number of the first page
- Using a different header and footer on first page
- Using a frame around the header, footer, or main worksheet

Note

- You may need to resize images or format text to keep the content within the header or footer.
- If your header is too wide to fit, change the margins to wide margins.

3

Supported and Unsupported Features

This appendix provides a comprehensive list of supported and unsupported features for PTC Mathcad Prime 3.1.

A number of Mathcad functions have been deprecated, and their support will be phased out in future PTC Mathcad Prime releases. Refer to the Help Center for a list of deprecated functions and suggested alternate functions to use in converted or newly created worksheets. Deprecated functions work properly when the worksheets that contain them are converted to PTC Mathcad Prime 3.1 format. They can also be used in PTC Mathcad Prime 3.1 directly, but are not documented in the Help Center.

Feature	In PTC Mathcad Prime 3.1	Not in PTC Mathcad Prime 3.1
New Ribbon		
Ribbon user interface based on Microsoft Office	✓	
Customizable Quick Access Toolbar	✓	
Physical constants in the Ribbon	✓	
Features and functionality are more visible and not hidden in menus and dialog boxes	✓	
Calculation		
Multithreading	✓	
System Support		

Feature	In PTC Mathcad Prime 3.1	Not in PTC Mathcad Prime 3.1
64-bit operating system support	✓	
Units		
Dynamic units	✓	
Mixed units in matrices and tables	✓	
Mixed units in plots	✓	
Choice of MKS, None, and customized unit systems		×
Most functions now accept units	✓	
Functions		
Localized function and keyword names		×
Two new and more flexible Fourier transform functions	✓	
24 new Design of Experiments (DOE) functions that support units	✓	
Data Analysis , Signal Processing, and Image Processing Extension Pack functions added	✓	
Improved performance for computational signal and image functions	✓	
Most functions now accept units	✓	
New Read/Write functions: READCSV and WRITECSV, READEXCEL and WRITEEXCEL, READTEXT and WRITETEXT	✓	
Advanced KNITRO 7.0 optimization software library for minimize and maximize solvers	✓	
New clear variable definitions function for numeric and symbolic expressions	✓	
Math and Equation Editor		
Choice of solving algorithms		×

Feature	In PTC Mathcad Prime 3.1	Not in PTC Mathcad Prime 3.1
Custom currency symbols		×
Definition and evaluation on the same line	✓	
Error tracing	✓	
Explicit evaluation feature	✓	
Hexadecimal, octal, and binary number format		×
Included worksheets can be cached for portability	✓	
Literal subscripts can be inside a variable name like H_2O	✓	
Math styles		×
Mixed numbers (fractions)		×
Multilevel worksheet references (include referenced files inside another worksheet)	✓	
New improved equation editor showing structure of the math	✓	
New Labels feature for using the same names for different elements, such as *m* for meters and *v* for variables.	✓	
Pdesolve and PDE solve blocks		×
Result Formatting Tolerance: Zero and complex threshold Number format: Show exponents as E ±000		×
Solve blocks as a block that can be moved as a grouped regions with a border	✓	
Solve blocks contain local variables.	✓	
Symbolic math (except for menu symbolics, symbolics in solve blocks, and symbolic result formatting)	✓	

Feature	In PTC Mathcad Prime 3.1	Not in PTC Mathcad Prime 3.1
Large symbolic results are truncated and can be resized to view as much of the result as desired	✓	
Matrices and Vectors		
Add and delete rows and columns from the Ribbon or with the mouse	✓	
Insert matrix with desired rows and columns from the Ribbon	✓	
Matrix navigator for panning and resizing large matrices	✓	
Mixed units in matrices	✓	
Operators		
Custom display of operators		×
Custom operators, prefix and postfix operators		×
Direct substitution of operators by overtyping	✓	
Global definition	✓	
Gradient operator		×
Indefinite integral	✓	
New linear and circular convolution operators	✓	
New polar operator	✓	
New row operator for matrices	✓	
Picture operator		×
Scalar operator	✓	
Square root and nth root operator combined into one operator	✓	
Two derivative operators combined into one operator with multiple placeholders	✓	
Two product operators combined into	✓	

Feature	In PTC Mathcad Prime 3.1	Not in PTC Mathcad Prime 3.1
one operator with multiple placeholders		
Two summation operators combined into one operator with multiple placeholders	✓	
Two-sided, left-hand, and right-hand limit operator combined into one operator	✓	
New Is Element Of comparison operator	✓	
Plots		
2D plots; traces: line, column, bar, stem, waterfall, error, box, effects	✓	
Animation, vector field plot, 3D bar, 3D patch, second y-axis		×
Box plot	✓	
Contour plots (improved)	✓	
Effects plot	✓	
Hide axis expression	✓	
Line markers (unlimited number)	✓	
Mixed units in plots	✓	
Pareto plot	✓	
Polar plots	✓	
Plot legends, titles, embedded regions		×
3D plots: spin, pan, zoom	✓	
3D plots: surfaces, curves, scattered plots	✓	
2D plots: trace and zoom		×
Waterfall plots and plotting matrices	✓	
Programming		
Debugging tools		×
Easier editing of programs	✓	
Mathsoft controls and web controls		×

Feature	In PTC Mathcad Prime 3.1	Not in PTC Mathcad Prime 3.1
New programming operators: if/else-if/ else and if/also-if/else	✓	
Programming operators can be inserted by typing	✓	
Document Features		
Align regions horizontally and vertically		×
Auto save		×
Collapsed areas	✓	
Copy worksheet regions to clipboard	✓	
Locked areas		×
Compare worksheets		×
Draft view and page view display	✓	
E-books		×
Embedded math in text	✓	
Find and Replace	✓	
Find all and replace all		×
Grid with two display settings	✓	
Hyperlinks		×
Improved headers and footers	✓	
Landscape pages	✓	
Math and text formatting	✓	
Multiple tabbed worksheet interface	✓	
Paste special		×
Print to XPS and PDF	✓	
Math and text region background color	✓	
Region border		×
Ruler and guidelines		×
Separate regions vertically or horizontally	✓	

Feature	In PTC Mathcad Prime 3.1	Not in PTC Mathcad Prime 3.1
Spell check		×
Tab to different regions	✓	
Templates	✓	
Text blocks that push down other regions	✓	
Text styles		×
Tile worksheets		×
View regions		×
Wide pages in draft view	✓	
Worksheet protection		×
XMCD, MCD Converter (single or batch) for converting previous versions of Mathcad worksheets to PTC Mathcad Prime 3.1 with annotated differences	✓	
Documentation		
New Help with bookmarks and math that can be copied to PTC Mathcad Prime 3.1 worksheets	✓	
New tutorials	✓	
Migration Guide for converting older worksheets to PTC Mathcad Prime 3.1	✓	
Detailed tooltips	✓	
Tables		
Insert a table with desired rows and columns from the Ribbon	✓	
Add and delete rows and columns by using the Ribbon or keyboard shortcuts	✓	
Tables include a header row for listing units	✓	
Each column can contain values of different units	✓	
Define multiple variables with vectors and units	✓	

Feature	In PTC Mathcad Prime 3.1	Not in PTC Mathcad Prime 3.1
Integration with other applications		
Microsoft Excel 2003, 2007, 2010 support	✓	
Excel add-in		×
Import or paste from Excel	✓	
READEXCEL function with preview and ability to edit function for parametric processing	✓	
PTC Creo Parametric integration	✓	
PTC Windchill Workgroup Manager integration	✓	
Excel Component	✓	
Automation API	✓	
SDK (Software Development Kit)	Supported, but available separately.	
User-defined DLLs	✓	
User-defined scripts		×