

Problem Solving in Physical Chemistry Introduction to Mathcad Part 4. Graphing Functions

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edited for Mathcad 12 by

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A. Variables can have a **range** of values. At the right, **type** the following

$x:=0,0.5;2*\pi$

which will result in

$x:=0,0.5..2\cdot\pi$

Now display the values of $\sin(x)$ for this range of x by typing

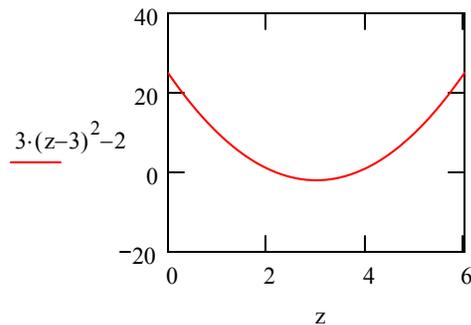
$\sin(x)=$

B. Functions can be graphed by Mathcad too. At the right is an example.

$z := 0, 0.1 .. 6$

Click once in the blank area at the right. A red cross appears; this is where the graph will be placed.

Activate the Graph pallet by clicking on View/Toolbars/Graph.



Then click on the graphing palette and select the X-Y plot icon.

Place x in the variable for the horizontal axis and place sin(x) in the variable for the vertical axis. Finally, click outside the graph area. Note the sharp angles due to the large steps in the range of x. Try $x:0,0.1;2*\pi$ for a smoother graph.

Note there is a quick key sequence to invoke the X-Y plot option: <shift-@>.

C. At the right, create a graph of the function

$$f(t) := 10 \cdot \exp\left(-\frac{t}{5}\right) \cdot \cos\left(\frac{t \cdot 2 \cdot \pi}{3}\right)$$

for $t=0,0.1;12$.

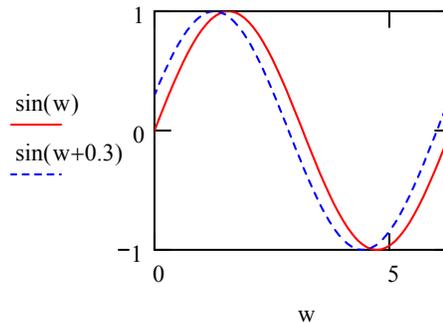
Save this file to your personal storage medium.

Exercises: Here are some additional exercises to work at your leisure and submit for grading.

A. Make a graph of $f(w) := 10 \cdot \cos\left(\frac{w}{2} \cdot 2 \cdot \pi\right) \cdot \exp\left(-\frac{w}{3}\right) + 1$, in the range $0 < w < 6$. [Use small enough steps that the plot appears smooth.]

B. There is sometimes a need to plot two functions on the same graph. You can do this by inserting a comma between the first and second variables being plotted. For example, here is a plot of $\sin(w)$ and $\sin(w+0.3)$ in the range $w=0,0.1;2\pi$.

$w := 0,0.1..2 \cdot \pi$



Now, **make a plot** showing both $\sin(w)$ and $-\cos\left(w - \frac{\pi}{2}\right)$. Tell mathcad that the range of w extends to 2π on the graph; do this by replacing the default upper range by $2 \cdot \pi$.

C. Plot two functions of two different variables. Namely, make a graph to show both

$$P(V) := \frac{0.08206 \cdot 298}{V} \text{ and } p(v) := \frac{0.08206 \cdot 298}{(v - 0.018)}.$$

Do this for V in the range $V: 0.025, 0.026; 0.100$ and for $v: 0.03, 0.04; 0.1$

$$V := 0.025, 0.026 .. 0.1 \quad v := 0.03, 0.04 .. 0.1$$

Modify the graph so that **$p(v)$ is shown by points only** without the line connecting points. Leave $P(V)$ as a smooth curve. **HINT:** double-click on the graph.

Save your work.

Submit this worksheet for grading as directed by your instructor.