Graphing data stored in arrays

Assume the following set of ordered pairs that need to be plotted, similar to an x/y scatter graph in Excel:

\[
\text{DataMatrix} := \begin{pmatrix}
2 & 1 \\
3 & .5 \\
4.75 & 2.3 \\
5.25 & 1.5 \\
\end{pmatrix}
\]

Pull data from each column of the array using the Matrix Column tool \( M^{\rightarrow} \) (ctrl-6)
Remember, the default for array starting locations in Mathcad is 0

\[
X := \text{DataMatrix}^{(0)}
\]

\[
Y := \text{DataMatrix}^{(1)}
\]

Check the values

\[
X = \begin{pmatrix}
2 \\
3 \\
4.75 \\
5.25 \\
\end{pmatrix}
\]

\[
Y = \begin{pmatrix}
1 \\
0.5 \\
2.3 \\
1.5 \\
\end{pmatrix}
\]

Quick Plot
Clean this graph up a bit by automatically setting the Axis limits

\[
\begin{align*}
\text{minx} & := \min(X) = 2 \\
\text{minx} & := \text{floor}(\text{minx}) = 2 \\
\text{maxx} & := \max(X) = 5.25 \\
\text{maxx} & := \text{ceil}(\text{maxx}) = 6 \\
\text{miny} & := \min(Y) = 0.5 \\
\text{miny} & := \text{floor}(\text{miny}) = 0 \\
\text{maxy} & := \max(Y) = 2.3 \\
\text{maxy} & := \text{ceil}(\text{maxy}) = 3
\end{align*}
\]

\[
\begin{pmatrix}
2 & 2.5 \\
3 & 1.5 \\
3.5 & .75 \\
4 & 1.5 \\
5.25 & 2.5
\end{pmatrix}
\]

Note that you can plot directly from the 2-D array

Graphing_Summing_Arrays
Summing Array Elements:

\[
\begin{pmatrix}
7 \\
6 \\
5 \\
4 \\
3 \\
2 \\
1
\end{pmatrix}
\]

\[
\text{ORIGIN} := 1
\]

Double check values in select locations

\[
C_2 = 6 \quad C_3 = 5 \quad C_4 = 4 \quad C_5 = 3
\]

\[
\text{sum} := \sum_{j=2}^{5} C_j
\]

Sum up elements in location 2 through 5 inclusive

This tool is found in the Calculus toolbar

\[
\text{sum} = 18
\]

check := \( C_2 + C_3 + C_4 + C_5 \)

\[
\text{check} = 18
\]

Note: Can not do this directly with functions as summing elements of functions defined with range variables does not really sum the elements themselves (if the range value does not increment by 1).

Example:

\[
f(q) := -q^2 + 9
\]

Define a function

\[
q := 0\.5..3
\]

Evaluate the function in increments not equaling 1

Note the .5 increment!

\[
f(q) =
\begin{array}{c}
9 \\
8.75 \\
8 \\
6.75 \\
5 \\
2.75 \\
0
\end{array}
\]

\[
f(3) = 0 \quad \text{This is a function!}
\]

\[
f_3 = 1 \quad \text{There is no value stored at the third location as this is not an array.}
\]

The above actually a sum of \( f(0) \) and \( f(1) \)

\[
f(0) = 9 \\
f(1) = 8
\]