[3.24] Use equations to build lists of lists and matrices

It is usually not possible to create a list consisting of other lists. This returns an *Invalid list or matrix* error:

    {3,{1,2},{3,4}}

and, interestingly, this

    {{1,2},{3,4}}   returns the matrix $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

However, you can create lists of lists and even more complicated data structures by using the list as an expression in an equation. Casting the first example in this form like this

    {3,a={1,2},b={3,4}}

simply returns the list in the same form. Note that *a* and *b* must not exist as variables in the current folder. The second example above would be

    {a={1,2},b={3,4}}

The equation variables *a* and *b* need not be unique. To reduce the chance that the equation variables are already in use, you can use international characters, for example

    {ä={1,2},ä={3,4}}

On the other hand, you can use the equation variables to label the lists:

    {result1={1,2},result2={3,4}}

You can build nested lists of lists:

    {ä={1,2,ä={3,4,ä={5,6}}}}

To extract the individual list elements, use the *right()* function and the list element indices. Suppose we save a lists of lists to variable *r*:

    {ä={1,2},ä={3,4}}→r

then

    r[1]   returns   ä={1,2}
    r[2]   returns   ä={3,4}
    right(r[1])   returns   {1,2}
    right(r[2])   returns   {3,4}

You can also include matrices in lists with this method:

    {ä=[1,2;3,4],ä=[5;6]}

(Credit to Bhuvanesh Bhatt)