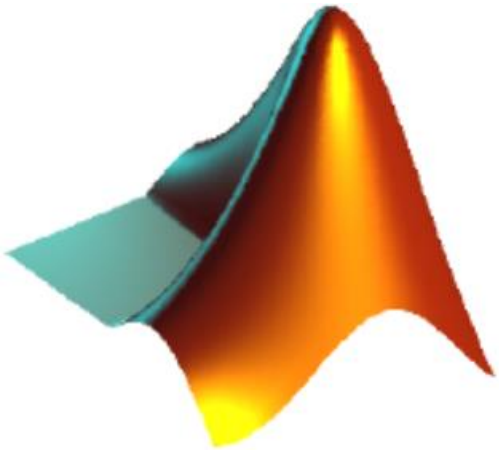
Cell Array
Matlab
(3)



Cell Array

- **Cell arrays** are **arrays** of **indexed cells** where each **cell can store** an **array** of a **different dimensions** and **data types (in contrast with arrays '1-D' and 'multi-dimensional')**.
- The **cell function is used for creating a cell array.**

Syntax:

```
C = cell(dim)
% dim is a scalar integer or vector of integers that specifies the dimensions of cell array C;
C = cell(dim1,...,dimN)
%dim1, ... , dimN are scalar integers that specify the dimensions of C;
```

Examples:

```
>> c = cell(2, 5);    % creating a 2* 5 cell array
>> c = {'Red', 'Blue', 'Green', 'Yellow', 'White'; 1 2 3 4 5}
    c =  'Red' 'Blue' 'Green' 'Yellow' 'White'
         [  1]  [  2]  [  3]  [     4]  [     5]
>> size(c) ans=??
>>c1 = {'Red', 'Blue', 'Green', 'Yellow', 'White' 1 2 3 4 5}
    c1= 'Red'  'Blue'  'Green'  'Yellow'  'White'  [1]  [2]  [3]  [4]  [5]
>>size(c1) ans=??
```

Accessing Data in Cell Arrays

- **Two ways to access data in cell arrays:**
  - Enclosing the indices in first bracket **()**, to refer to sets of cells .
  - Enclosing the indices in braces **{}**, to refer to the data within individual cells.

```
>>c = {'Red', 'Blue', 'Green', 'Yellow', 'White'; 1 2 3 4 5};
>>c1= c(1), c2= c(2), s=size(c1), iscell(c2), c3=c{1}, s=size(c3), iscell(c3)
    c1= 'Red'
    c2=[1]
    s= 1*1
   ans=1
   c3='Red'
   s=1*3
  ans=0
>>c(1:2,1:2)
     ans =  'Red' 'Blue'
            [   1]   [   2]
>> s=size(ans), iscell(ans)      %iscell: check whether the input is a cell array or not
    s=2*2
    ans=1
```

Accessing Data in Cell Arrays (Cont.)

>>c = {'Red', 'Blue', 'Green', 'Yellow', 'White'; 1 2 3 4 5};

>>c1= c(1), s=size(c1), iscell(c1), c3=c{1}, s=size(c3), iscell(c3)

*c1= 'Red' s= 1*1 ans=1 c3='Red' s=1*3 ans=0*

>>c{1:2,1:2}

ans = Red

ans = 1

ans = Blue

ans = 2

>> s=size(ans), iscell(ans)

*s=1 *1*

ans=0

>> c(1)={magic(4)}

c = [4x4 double] 'blue'

[1] [2]

>>c(1) =magic(3)

Conversion to cell from double is not possible.

>>c{1}=magic(3)

c = [3x3 double] 'Blue' 'Green' 'Yellow' 'White'

[1] [2] [3] [4] [5]

>>c{1}, c(1)

ans=??

Quiz 1

- Create a 1*3 cell array such that:

  A: the first element is a square magic array with size(3*3).

  B: the second element is a row vector of the column sum of the array A.

  C: the third element is the product of all A elements.

Note: **prod function** is used to **calculate** the **product** in the same manner as the sum function

Quiz 1: Solution

```
>> A=magic(3);
>> B=sum(A);
>> C=prod(prod(A));
>> D={A, B, C }
    D =    [3x3 double]    [1x3 double]    [362880]
>> A=magic(4);     % although the matrix 'A' is changed, the cell array 'D' doesn't change
>> d=D{1}, size(d), iscell(d)
    d= 8    1    6
       3    5    7
       4    9    2
    ans=3*3
    ans=0
>> d2=D(1), size(d2), iscell(d2)
    d2= [3x3 double]   ans=1*1   ans=1
```

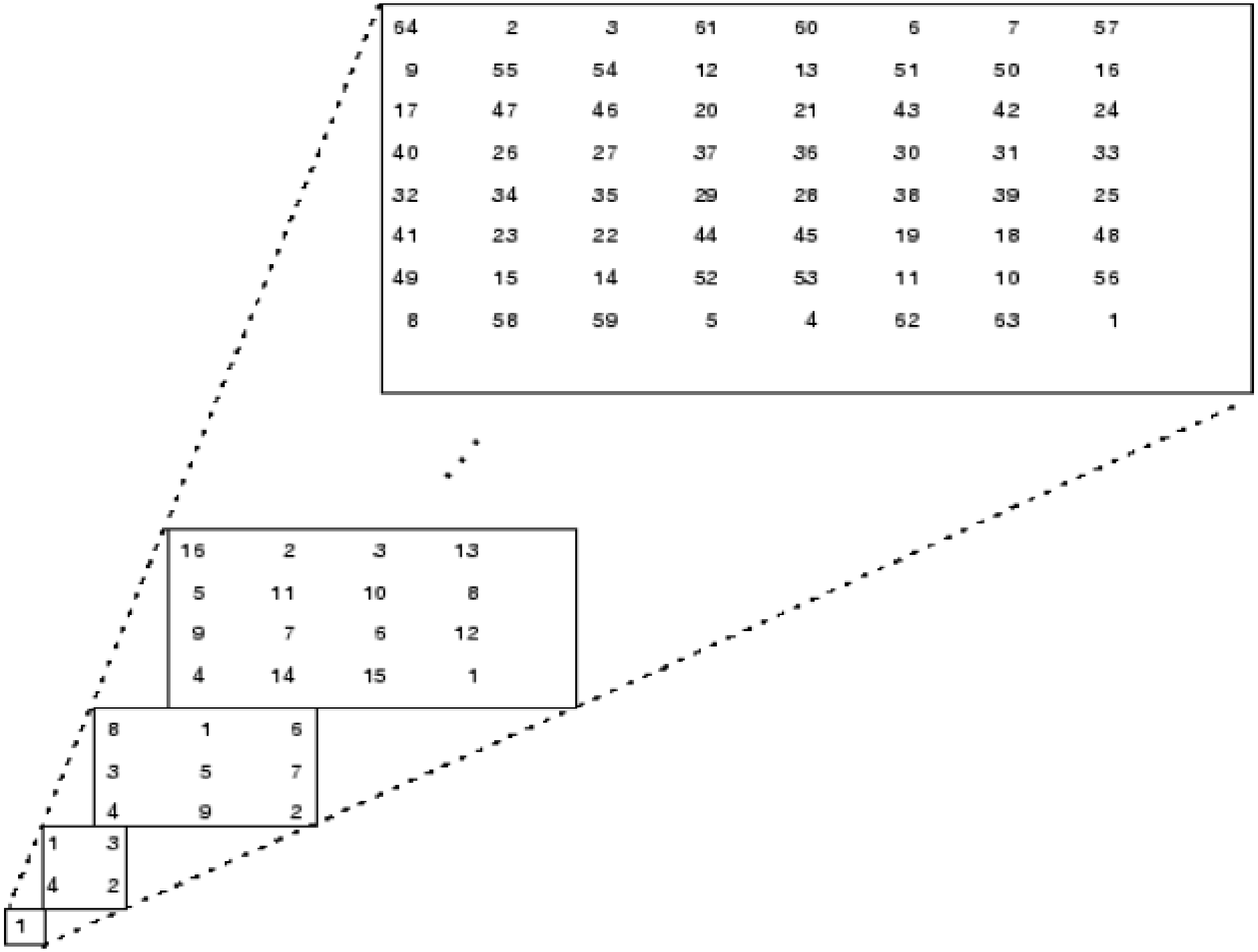
Quiz 2

- Create a cell array with size (8*1), such that:

  Each row element is a square magic array of size(row #)

Quiz 2 solution

```
>> M = cell(8,1);
>> for n = 1:8
M{n} = magic(n);
end
>> M
    [       1]
    [2x2 double]
    [3x3 double]
    [4x4 double]
    [5x5 double]
    [6x6 double]
    [7x7 double]
    [8x8 double]
```


64 2 3 61 60 6 7 57
9 55 54 12 13 51 50 16
17 47 46 20 21 43 42 24
40 26 27 37 36 30 31 33
32 34 35 29 28 38 39 25
41 23 22 44 45 19 18 48
49 15 14 52 53 11 10 56
8 58 59 5 4 62 63 1
16 2 3 13
5 11 10 8
9 7 6 12
4 14 15 1
8 1 6
3 5 7
4 9 2
1 3
4 2
1