

**Armstrong State University**  
**Engineering Studies**  
**MATLAB Marina – Cell Arrays Exercises**

1. Answer the following questions for MATLAB cell arrays:
  - a) How can cell arrays be created?
  - b) How can one extract the containers of a cell array?
  - c) How can one extract the data of a cell array container?
  - d) How can one preallocate space for a cell array?
  - e) What operations can be done on cell arrays?
2. Create and run the MATLAB program of Figure 1 that creates a five by three cell array. From the MATLAB Command Window, perform the following operations on the created `ageWealthData` cell array:
  - Display the cell array using the MATLAB `disp` function. How is the data in the cell array displayed?
  - Extract the container holding the first name (Lucy) using cell array indexing.
  - Extract the container holding Lucy's age using cell array indexing.
  - Extract the numeric data for Lucy's age using cell array indexing.

```
clear all;
clc;
close all;

% create cell array of names, ages, and net worth
ageWealthData = {'Lucy', 7, 45000;
                 'Sally', 18, 150000;
                 'Martha', 64, 75000;
                 'Bob', 47, 200000;
                 'Ed', 36, 0};
```

Figure 1, MATLAB Program to Create Cell Array

3. Add code to the MATLAB program of Figure 1 that will extract the net worth data from the `ageWealthData` cell array and determine the average net worth of the individuals. The code added should work for any cell array of data formatted like the `ageWealthData` cell array, not just the specific `ageWealthData` cell array in Figure 1.
4. Add code to the MATLAB program of Figure 1 that will determine the number of individuals who are above 20 years of age and have a net worth exceeding \$50000. The code added should work for any cell array of data formatted like the `ageWealthData` cell array, not just the specific `ageWealthData` cell array in Figure 1.

5. Modify the MATLAB program of Figure 2a so that the volume and weight data that is read in is stored in a cell array rather than displayed. The cell array should be arranged as an n by 2 cell array where column one holds the volumes and column two holds the weights. Figure 2b shows the cell array format.

```
clear all;
clc;
close all;

% read in and display volume and weight data
numberItems = input('Enter number of items: ');

for k = 1:1:numberItems
    % read in volume and weight
    volume = input('Enter volume (m^3): ');
    weight = input('Enter weight (kg): ');
    % display volume and weight
    fprintf('For object %d, volume is %f m^3 and weight is %f
kg\n', k, volume, weight);
end
```

Figure 2a, MATLAB Program to Read in and Display Volume and Weight Data

```
{10, 37; 12 8; 2 46}
```

Figure 2b, Cell Array Format for Problem 5

6. Modify your MATLAB program from Problem 5 so that the cell array is arranged as an n by 1 cell array. Each cell should be a 1 by 2 cell array containing the volume and weight of the item. Figure 2c shows the cell array format.

```
{{10, 37}; {12 8}; {2 46}}
```

Figure 2c, Cell Array Format for Problem 6

7. Write a MATLAB function named `displayCellArray` that takes a 2-D cell array and displays the data in each container. You may assume that the cell array contains only scalar data (no arrays, structures, structure arrays, cells, or cell arrays). Hint MATLAB's `size` function works for cell arrays. For example for the cell array `{10, 37; 12 8; 2 46}` should be displayed as shown in Figure 3

```
10 37  
12 8  
2 46
```

Figure 3, Display Format for `displayCellArray` Function

Last modified Thursday, November 13, 2014



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