Worksheet 8

8.1 **Try to walkthrough the following program and write down the expected results. Key-in the program and compare the results after execution. This program helps you to understand the use of one-dimensional arrays.**

```c
/* This program reads a number set of input numbers
   and finds the average and standard deviation of the numbers. */

#include <stdio.h>
#include <math.h>
#define Max_Size 20

double sqrt (double Number);

int main (void)
{
    double NumberArray[Max_Size];
    int NumOfData;
    double Sum;
    double SumOfSquares;
    double Average;
    double SD;
    int i;
    char Choice;

     do
      {do
        { printf("\nHow many number do you want to input (1 - 20)? ");
          scanf("%d", &NumOfData);}
         while (NumOfData > 20 || NumOfData <= 0);

        printf("\nPlease input %d real numbers", NumOfData);
        printf("\nThe program will find the average and standard");
        printf("\ndeivation of this list of positive numbers and");
        printf("\nalso the deviation of each number from the average.\n");


        Sum = 0;
        SumOfSquares = 0;

        for (i = 0; i < NumOfData; i++)
           {      printf("Please input Data[%d] : ", i+1);
                  scanf("%lf", &NumberArray[i]);

                  Sum += NumberArray[i];
                  SumOfSquares += NumberArray[i]*NumberArray[i];
           }

        Average = Sum/NumOfData;
        SD = sqrt(SumOfSquares/NumOfData - Average*Average);

        printf("\nThe average is %7.2f", Average);
        printf("\nThe standard deviation is %7.2f", SD);
        printf("\n");
```

```
        printf("\n\t Data \t\t Deviaton\n");

        for (i = 0; i < NumOfData; i++)
            printf("\n\t%lf\t%lf", NumberArray[i], NumberArray[i]-Average);

        printf("\n\nDo you want to try again (y/n)? ");
        scanf(" %c", &Choice);
    } while ((Choice == 'y') || (Choice == 'Y'));



    printf("\nEnd of Program");
    printf("\n");

    return 0;
}
```

Sample running :

How many number you want to input (1 - 20)? *6*<CR>

Please input 6 real numbers
The program will find the average and standard
deviation of this list of positive numbers and
also the deviation of each number from the average.

Please input Data[1] : *12*<CR>
Please input Data[2] : *24*<CR>
Please input Data[3] : *26.4*<CR>
Please input Data[4] : *25.8*<CR>
Please input Data[5] : *34*<CR>
Please input Data[6] : *24*<CR>