CSC-101 – HW7

Q1 (25 Points) Write a C++ program that declares an array `alpha` of **50** components of type `double`. Initialize the array so that the first 25 components are equal to the square of the index variable (the position that element will occupy), and the last 25 components are equal to three times the index variable. Output the array so that 10 elements per line are printed.

For the number at index 5, the value would be 25, which is 5 squared. The 25th index would hold a value of 75, which is 3 * 25.

An example of the program output is shown below:

```
0   1   4   9  16  25  36  49  64  81
100 121 144 169 196 225 256 289 324 361
400 441 484 529 576  75  78  81  84  87
90  93  96  99 102 105 108 111 114 117
120 123 126 129 132 135 138 141 144 147
```

Q2 (25 points) Write a program that reads a file consisting of students' test scores in the range **0–200**. It should then determine the number of students having scores in each of the following ranges:
0–24, 25–49, 50–74, 75–99, 100–124, 125–149, 150–174, and 175–200.
Output the score ranges and the number of students. (Run your program with the following input data:

```
76, 89, 150, 135, 200, 76, 12, 100, 150, 28, 178, 189, 167,
200, 175, 150, 87, 99, 129, 149, 176,  200, 87, 35, 157, 189
```

Q3 (25 Points) Write a program that allows the user to enter the last names of five candidates in a local election and the number of votes received by each candidate. The program should then output each candidate's name (**Candidate**), the number of votes received (**Votes Received**), and the percentage of the total votes received by the candidate (**% of Total Votes**). Your program should also output the winner of the election.

Your program must contain at least the following functions:

- a function to determine the sum of votes.
- a function to output the winner of the election.

A sample output is:

Candidate	Votes Received	% of Total Votes
Johnson	5000	25.91
Miller	4000	20.73
Duffy	6000	31.09
...	...	...
Total Votes:	**19300**	

The Winner of the Election is Duffy

Q4 (25 Points) Write a program that uses a 3 x 3 array and randomly place each integer from 1 to 9 into the nine squares. The program calculates the magic number by adding all the numbers in the array and then dividing the sum by 3. The 3x3 array is a magic square if the sum of each row, each column, and each diagonal is equal to the magic number.

Your program must contain at least the following functions: a function to randomly fill the array with the numbers and a function to determine if the array is a magic square. Run these functions for some large number of times, say 1,000, 10,000, or 1,000,000, and see the number of times the array is a magic square.