Assignment 2
Programming Principles II

The goal of this assignment is to learn c++ 2D dimensional arrays, pointers and passing arrays to functions.

1) Write a one dimensional array that determines the lowest value among the five input values typed from the keyboard and prints the difference of each value from the lowest one. You can do this in three steps:

   a) read the 5 numbers from the keyboard and save them in an array
   b) find the lowest number in the array
   c) subtract the lowest number from each element in the array

2) Write a c++ function that takes three input parameters: a one dimensional array, its size and an integer. Your function should check whether the integer is in the array or not. It should return true if the number is in the array and false if it is not in the array. Then write a main program that reads in 5 integers and another number to search for and prints a message saying whether the number is in the array or not. Sample usage of your program should be as follows:

   Enter 5 integers: 10 13 2 17 23
   Enter an integer to search for: 17
   17 is in the array of numbers

3) Write a c++ function that accepts a square matrix of size 3x3 and its size as parameters. Your function should return true if the matrix is a magic square matrix or false if it is not. A magic square matrix is a square matrix (number of rows equal to the number of columns) such that the sum of each row, the sum of each column, and the sum of each diagonal are equal Then write a main function that reads in the matrix and prints whether the matrix is magic or not. Sample usage is:
   Enter a 3x3 matrix of integers: 2 7 6
   9 5 1
   4 3 8
   The matrix is a magic matrix with a magic constant = 15

4) If two dice are rolled. what is the probability of getting (1, 2), or (2, 3) and so on. We can answer these questions analytically, but you need to write a code to verify the results. You can do that following the steps:
   a. Write a function rollDices that takes two parameters as output parameters (return values through them). The function when called should return two random integers, each one between 1 and 6, where each one represent the value of a rolled die.

      Use the following code to generate a random number between a and b. We seed the random number generator using srand function as shown below.

```
#include <time.h>
#include <stdlib.h>
using namespace std;

//... you other functions ...

int main () {
    // seed random number generator
    srand ( time(NULL) );
    // your other code here
    // generate a random number between 1 and 10
    int randomNumber = rand() % 10 + 1;
}
```

b. Write another function rollProb that takes a two dimensional array 6x6 and an integer numberOfRolls. The function should call the rollDices function numberOfRolls times, and for each call it should increment the corresponding cell in the array.

c. Your main program should prompt the user for the numberOfRolls and calls the function rollProb and then prints the probability of obtaining each pair of values. Try it with 4 different number of rolls: 100, 1000, 10000, 100000. I will explain it more in class.