EE402 Tutorial 1 – The C of C++

Please solve the following short C++ problems. Your code should be concise and as efficient as possible, while still preserving best practice - i.e. avoid cutting-and-pasting any code. Note**: Each tutorial will be designed to have questions that become progressively more difficult, from fairly straightforward to very challenging.** There is no use of classes in this tutorial.

Q1. Write a function of the form: double sumDouble(double, double), which when given two double values, returns their sum. However, if the two double values are the same then it should return twice their sum. e.g.
sumDouble(1, 2) → 3
sumDouble(3, 2) → 5
sumDouble(2, 2) → 8

Q2. Write a function of the form: string helloName(string) that, when given a C++ string type name, e.g. "Bob", returns a greeting of the form "Hello Bob!". e.g.
helloName("Bob") → "Hello Bob!"
helloName("Alice") → "Hello Alice!"
helloName("X") → "Hello X!"

Q3. We have two monkeys, a and b, and the parameters aSmile and bSmile indicate if each is smiling. We are in trouble if they are both smiling or if neither of them is smiling. Return true if we are in trouble. e.g.
monkeyTrouble(true, true) → true
monkeyTrouble(false, false) → true
monkeyTrouble(true, false) → false
You do not need to use classes for this question.

Q4. Write a function of the form void square(int &), where the int value that is passed by reference to the function is squared. Demonstrate that the function works correctly.

Q5. Write a function of the form int countEvens(int[], int) that returns the number of even ints in a given array, when passed the array and the number of elements in the array. Remember the % "mod" operator computes the remainder, e.g. 5 % 2 is 1.
countEvens({2, 1, 2, 3, 4},5) → 3
countEvens({2, 2, 0},3) → 3
countEvens({1, 3, 5},3) → 0

Q6. Write a function of the form bool sum28(int[], int) that when given an array of ints and the array size, returns true if the sum of all the 2's in the array is exactly 8.
sum28({2, 3, 2, 2, 4, 2},6) → true
sum28({2, 3, 2, 2, 4, 2, 2},7) → false
sum28({1, 2, 3, 4},4) → false

Q7. We can receive strings from the command line in C/C++ as the main function can be written in the form:

```
int main(int argc, char *argv[])
```

Use this ability to read in an array of strings from the command line and then print them out in reverse order – e.g.
stringReverse The reverse side also has a reverse side
should output: "side reverse a has also side reverse The"

Q8. Using the same syntax as in Q7, write a program that will display the distribution of the number of words of each letter length (up to 9 letters long) in a sentence that is passed to that application.

Wordsize the final exam will be based on the one lecture you missed and the one book you didnt read

should output:

```
There are 19 strings
The number of strings with:
Length 1 characters: 0
Length 2 characters: 2
Length 3 characters: 8
Length 4 characters: 4
Length 5 characters: 3
Length 6 characters: 1
Length 7 characters: 1
Length 8 characters: 0
Length 9 characters: 0
```

Q9. Write a function of the form int factorial(int) that when passed a value of 1 or more, returns the factorial of n, which is n * (n-1) * (n-2) ... 1. Compute the result recursively by calling the factorial function itself (Do not use loops or pointers).
factorial(1) → 1
factorial(2) → 2
factorial(5) → 120

Q10. Write a function of the form: int* reverse(int[],int) that, when given an array of ints returns a new array with the elements in reverse order, so an array of size 5 elements with the array values {11, 22, 33, 44, 55} becomes {55,44,33,22,11}. e.g.
reverse({5, 11, 9}) → {9, 11, 5}
reverse({7, 0, 0, 10}) → {10, 0, 0, 7}