

Question 1 & 2

```
#include <iostream>
using namespace std;

enum gender_t { male = 1, female = 2 };

class Animal {
    protected:
        string name;
        int height; // in cm
        int weight; // in kg
        gender_t gender;

    public:
        virtual void move() = 0; /** abstract method */

        void display() {
            cout << "name : " << name << endl
                 << "height : " << height << " cm" << endl
                 << "weight : " << weight << " kg" << endl
                 << "gender : " << gender << endl;
        };

        Animal(string name_ = "unknow",
              int height_ = 0,
              int weight_ = 0,
              gender_t gender_ = male) :
            name(name_),
            height(height_),
            weight(weight_),
            gender(gender_) {};
};

class Dog : public Animal {
    public:
        virtual void move() {
            cout << "this Dog is moving ";
        };

        void move(string destination) {
            move();
            cout << "to " << destination << endl;
        }

        Dog(string name_ = "unknow",
            int height_ = 0,
            int weight_ = 0,
            gender_t gender_ = male) :
            Animal(name_, height_, weight_, gender_) {};
};

int main()
{
    Dog* bob = new Dog("bob", 170, 60, male);
    bob->display();
    bob->move("Dublin");
    return 0;
}
```

Question 3

```
void by_reference_modifier(Dog& reference) {
    reference.height(50);
}

void by_value_modifier(Dog value) {
    value.height(100);
}

int main()
{
    Dog bob;
    by_reference_modifier(bob); // set height to 50
    by_value_modifier(bob); // do not set height to 100
    bob.display(); // display « height = 50 »
    return 0;
}
```

Question 4

```
int count7s(int val) {
    if(val !=0) return (val%10 == 7) + count7s(val/10);
    else return 0;
}
```

Question 5

```
string mirrorEnds(string input)
{
    string output="";
    int length = input.length();

    for(int i=0; i<length; i++)
    {
        if(input[i] == input[length-i-1])
            output+=input[i];
        else break;
    }
    return output;
}
```

Question 6

```
int wordsCount(string strings[], int nb_values, int wanted_length) {
    int result=0;
    for(int i=0; i<nb_values; i++) {
        if(strings[i].length() == wanted_length)
            result++;
    }
    return result;
}
```

Question 7

```
#include <climits>

int bigDiff(int array[], int size) {
    int min=INT_MAX, max=INT_MIN;
    for(int i=0; i<size; i++) {
        if(array[i] > max)
            max = array[i];
        if(array[i] < min)
            min = array[i];
    }
    return max - min;
}
```

Question 8

```
class ArrayMath {
    private:
        float values[100];
        int nb_values;

    public:
        void display(){
            cout << "We have " << nb_values << " floats stored : " << endl;
            for(int i=0; i<nb_values; i++)
                cout << i << " : " << values[i] << endl;
        };

        ArrayMath(float array[], int size) : nb_values(size) {
            for(int i=0; i<100; i++) {
                if(i<nb_values) values[i] = array[i];
                else values[i] = 0;
            }
        };

        ArrayMath() : nb_values(0) {
            for(int i=0; i<100; i++) {
                values[i] = 0;
            }
        };
};
```

Question 9

```
#include <cmath>

class ArrayMath {
private:
    float values[100];
    int nb_values;

public:
    void display() {
        cout << "We have " << nb_values << " floats stored : " << endl;
        for(int i=0; i<nb_values; i++)
            cout << i << " : " << values[i] << endl;
        cout << "maximum is : " << maximum() << endl;
        cout << "minimum is : " << minimum() << endl;
        cout << "average is : " << average() << endl;
    };

    ArrayMath(float array[], int size) : nb_values(size) {
        for(int i=0; i<100; i++) {
            if(i<nb_values) values[i] = array[i];
            else values[i] = 0;
        }
    };

    ArrayMath() : nb_values(0) {
        for(int i=0; i<100; i++) {
            values[i] = 0;
        }
    };

    float average() {
        float average=0;
        for(int i=0; i<nb_values; i++)
            average += values[i] / nb_values;
        return average;
    };

    float minimum() {
        float min = FLT_MAX;
        for(int i=0; i<nb_values; i++)
            if(values[i] < min)
                min = values[i];
        return min;
    };

    float maximum() {
        float max = FLT_MIN;
        for(int i=0; i<nb_values; i++)
            if(values[i] > max)
                max = values[i];
        return max;
    };
};

int main()
{
    float test_values[] = {2, 10.4, 7, 2.1, 8};
    ArrayMath* test = new ArrayMath(test_values, 5);
    test->display();
    return 0;
}
```

Question 10

```
public class Main {  
  
    protected static String[] values = {"Teresa Green", "Rick O'Shea",  
                                        "Robin Banks", "Barry Cade", "Sam Pull"};  
  
    public static void main(String[] args) {  
        for(int i=0; i<values.length; i++) {  
            System.out.println("Hello " + values[i]);  
        }  
    }  
}
```