You have 50 minutes. You may use one prepared 8.5 × 11 sheet of paper. All questions concern the C++ programming language. Check your answers.

1. Function sumSq(a, b) is defined as follows. It takes two integers a and b where \(a \leq b\) and returns the sum of the squares of the integers \(i\) where \(a \leq i \leq b\). For example, sumSq(2, 5) should return \(2^2 + 3^2 + 4^2 + 5^2 = 4 + 9 + 16 + 25 = 54\). Notice that sumSq(5,5) should return 25.

Write a C++ definition of sumSq(a, b). Use a scan algorithm. For this version, use a loop. Do not use recursion.

The function body must not change the value of a or b. Do not use arrays or strings or any data structure from the Standard Template Library (which most of you have never heard of).

A heading is provided.

```cpp
int sumSq(int a, int b)
```
2. Write a C++ definition of the same function `sumSq(a, b)` as in the preceding question. But this time use recursion. **Do not use any kind of loop.**

**The function body must not change the value of a or b or any other variable.** For this problem, do not define any helper functions. Do not use arrays or strings or any data structure from the Standard Template Library.

A heading is provided.

```cpp
int sumSq(int a, int b)
```

3. Function `next(n)` for the hailstone sequence is defined to return `n/2` if `n` is even and `3n + 1` if `n` is odd. Write a definition of `next(n)`.

**The body of next must not change the value of any variable.** Do not use a loop or recursion or an array or a string or any data structure from the standard template library. Do not use a helper function for this problem.

A heading is given.

```cpp
int next(int n)
```