**Programming Assignment 3**

1. Write an algorithm to determine if a number n is "happy". A happy number is a number defined by the following process: Starting with any positive integer, replace the number by the sum of the squares of its digits, and repeat the process until the number equals 1 (where it will stay), or it loops endlessly in a cycle which does not include 1. Those numbers for which this process ends in 1 are happy numbers. Prints True if n is a happy number, and False if not.

**Input:** 19

**Output:** true

**Explanation:**

12 + 92 = 82

82 + 22 = 68

62 + 82 = 100

12 + 02 + 02 = 1

Paste your code below in two versions, one using while statement and another one using for statement:

**Version 1: while loop**

int number;

int is\_happy\_number;

// …

// …

if(is\_happy\_number) std::cout << “true”;

else std::cout << ”false”

**Version 2: for loop**

2. Paste your code to compiler explorer <https://godbolt.org/>. Do you see any difference between the two versions in terms of assembly? (with optimization -O2)