Assignment 4 CISC 3325

1. C++ program with a heap buffer overflow
    a. Download the following program that exploits a shortcoming of STL vectors (which uses the heap) and iterators. Compile and run the program. Try at least three different scenarios:
        - No command line argument.
        - A small command line argument larger than 10 but around 20 - 30.
        - A very large command line argument.
        4. Explain what happened in each case. Did you receive a memory fault in the last case? (Depends on the IDE or OS you use.)
        5. How could the problem be fixed?

    b. Write a program in Java that dynamically allocates a large integer array. Please include a copy of your code in what you hand in or e-mail to me.
        - Start with an array with at least 100 million elements. Increase the size (number of elements) of the array until an exception is generated. The operating system should generate a hardware interrupt when the amount of user addressable space has been exhausted. Java should pass this interrupt on as an exception.
        - How much memory was used before the exception was generated? You can calculate the number of bytes by multiplying the `sizeof(int)` times the total number of integers requested. You should print out this value each time the number of elments was increased.
        - Is naively running out of heap memory an exploitable vulnerability in Java?