

CSCI-14 Lab 11 – due before midnight the last day of class before finals week, with no late labs accepted

Write a program to solve the 100 elves problem. The idea is that there is a hut in the woods where a man has hidden exactly 100 ounces of gold. Each night for 100 nights (counted by n from 1), an obsessive-compulsive elf sneaks into the hut and steals $n\%$ of the REMAINING gold. On the first night, the elf steals 1% of the gold, the next night the elf steals 2% of the remaining 99% of the gold, etc. Your program should print out a table showing the sequence number of the night, the amount of gold stolen that night, and the amount of remaining gold that night. Print one night's information per line.

Afterwards, print out the night, amount of gold stolen and remaining amount of gold for the largest amount stolen; and the night, amount of gold stolen and remaining amount of gold for the night that the remaining amount of gold goes below 50 ounces. Your program must determine these values for itself by monitoring the values during execution; you cannot just observe the program's execution and look for the appropriate numbers yourself. Print these two lines of information after printing the table showing the activity for the 100 nights.

Your output table must be set up so that the columns are the same width all the way down (use `cout << setw(width)` to set the next output's field width). In addition, the table must have a title line (or lines) showing what data the columns contain. You must allow the output to go into scientific notation, rather than require the decimal point and leading 0's. (If you do not use `showpoint` and `fixed`, this will happen automatically when output no longer fits in the field otherwise, and the values will get far too small to fit in any reasonably sized field). Send your output directly to a file in the program. Attach the source and output files to an e-mail as usual.

Hints: The precision needed for the calculations will reach at least 15 significant digits. Therefore, use at least double precision (or long double) variables for your calculations. This is not a long program. There are a couple of good approaches to solving this.