Programming component for Homework #3

The egg drop problem: There is a building with **n** floors. You have identical eggs with the property that any egg will break iff thrown from floor **B** or above. If an egg breaks, you cannot fix and reuse it. You want to determine the value of **B**. Consider the case where you only have one ball. In this case, the worst-case number of trials needed is **n** since the value of **B** may be equal to **n** and the only strategy is to start dropping the ball from floor 1,2,3, and so on. Now, suppose you have two balls. Consider the strategy that minimizes the number of trials in the worst-case. Let this worst-case number of trials be denoted by **T(n,2)**. Similarly, we can define **T(n,3)**, **T(n,4)**,... (for 3 balls, 4 balls etc.). Design an algorithm to compute the value of **T(n,k)** for any given **k** and **n**.

INPUT: The first line in the input file is *n,k*. Below we give an example input file ("input.txt"):

5,1

OUTPUT: The first line of the output file ("output.txt") should be the value of **T(n,k)**. This should be followed by a comma-separated line that gives the sequence of floors from which the eggs will be dropped by the optimal strategy to determine **B**. Below is the output file corresponding to the above input file.

5
1,2,3,4,5

SUBMISSION INSTRUCTIONS: All your program files should be in a directory named <Your Entry Number in Caps>. You will be asked to create a zip of this directory and submit this zip file. In this directory, there should be a makefile that will compile your code (read about makefile on the net in case you do not know what it is). This should create an executable called "eggdrop" (in case you are using java/python, this could be a shell script). This when executed, should read the input file (input.txt) and write the answer in the output file. (output.txt).

EXTRA: Consider the two-egg problem (i.e., **k** = 2) Run your program for various values of **n** and develop a hypothesis about the value of **T(n,2)** as a function of **n**. Try to argue the correctness of your hypothesis. Try doing similar thing for **T(n,3)** and so on. This is just something for you to think about. You need not submit this.