Assignment

Write a program named `tree.cpp` that draws a pine tree of a specified height as illustrated below.

How tall should the tree be?: 6
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1. Prompt the user for the height of the cone of the tree
2. Read the height from the keyboard into a variable named `height`
3. If the cone height is less than 3 or greater than 15 (3 is okay and 15 is okay), then the program prints an error message and terminates
4. I suggest implementing and testing in this order (this not the order that code appears in the final program)
   a. prompt and read the height
   b. test for height being out of bounds
   c. draw the base
   d. draw the trunk (no spaces between the sides) one half the height of the cone
   e. draw the cone
5. The image below shows the relationship between all of the parts of the tree for a tree with a height of 6 (no space between the sides on the top level or between the sides of the trunk):

Hints

- Use three for-loops to draw the cone: two loops nested in side an outer loop:
  - The outer for-loop moves the cursor from the top of the cone to the bottom; use “level” as the loop control variable and treat “height” as a constant
  - Use one nested for-loop to move the cursor from the left edge of the screen to the left side of the cone
  - Use the second nested for loop to move from the left side of the cone to the right side of the cone. See the table of escape sequences in chap 2 to see how to draw a back-slash character
  - Note that there is not a space between the sides of the cone at the peak
- Use one for-loop to draw the base of the cone
  - Note that there is not a blank line between the sides of the cone and the base
• Use two for-loops, one nested inside the other, to draw the trunk
• The outer loop moves the cursor from the top of the trunk to the bottom
• The nested loop moves the cursor from the left edge of the screen to the left side of the trunk
• Note that there is not a space between the two sides of the trunk

Computer scientists often use pictures to help them solve a problem. A picture helps to show the relations between different parts of a problem and to identify patterns occurring in the problem. The patterns can often be generalized into formulas that guide the program. This picture shows the relations between the height of the cone and other intermediate quantities.

It is important to note that the loop-control variable of a nested loop can be based on the loop-control variable of an outer loop (again, see the pyramid program that will be written in class). Use this picture as a guide to writing the necessary for loops.

```plaintext
level = 0
level = 1
level = 2
level = 3
level = 4
level = height 1
```

**Program Submission and Grading**

The program should exhibit good programming style.

Upload `tree.cpp` to Blackboard for grading.

Be sure the program file is named correctly and that it does not include unspecified prompts.