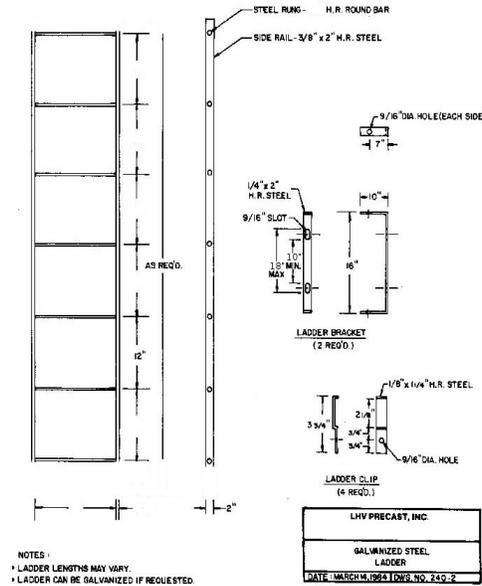


# CS118 Programming Assignment

## Ladder Manufacturer

ERAU Ladder Company makes customized ladders for their clients. The most basic ladder they offer is a steel ladder with round rungs.

You have been tasked with writing a Python program that will help the manufacturer determine the total stock of steel tubing that will be needed to manufacture all of the rungs for a customer-specified ladder.



The customer is required to specify the total height; the ratio of the length of the top rung to the length of the bottom rung; the dimension of the bottom rung; and the total number of rungs on the ladder. However, OSHA and the ERAU Ladder Company have specified some safety criteria:

- The ratio of length between the top rung and bottom rung cannot exceed 1.0 and cannot be less than 0.6
- The rungs must be evenly spaced with no less than 10" apart between rungs, and no greater than 18"

In case of any invalid data (e.g. all dimensions must be greater than 0; rungs must be evenly spaced; etc.) repeat the request for that particular item only until that input is valid. If the user enters a value for the number of rungs which will not have valid spacing criteria, your program should provide the user with the minimum and maximum number of ladder rungs for the specified height and spacing. As long as the number of rungs is invalid, the program should continue to seek a new input.

Your program should output the total length of material needed to manufacture all of the rungs and allow the user to repeat the design of their ladder and only exit when user chooses to stop testing. When determining the total length of the rungs, you may assume that the diameter of the rung is infinitely small (i.e. you may treat the rungs as lines, not cylinders). Also, the ladder has no "feet" - the first and last rung are precisely at the ends of the ladder.

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Ladder height (inches): 300
Ratio: length of top rung to length of bottom run (0.6<=ratio<=1.0): 0.7
Length of bottom rung (inches): 14
Number of rungs: 40

There must be at least 18 rungs and no more than 31 rungs

Number of rungs: 25
For a ladder of 300.0 inches (25.0 feet) with
 25 rungs and a rung spacing of 12.5 inches,
 you will need 297.5 inches (24.8 feet) of tubing.

Would you like to repeat the program? (Y/N)
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