**Name**

**Advanced Programming in C++**

**Lab Exercise 4/3/2025**

**Review Exercises**

**Here are some problems that will test your knowledge of the basics of C++**

1. Create a function that finds the maximum range of a triangle's third edge, where the side lengths are all integers.

Examples

nextEdge(8, 10) ➞ 17

nextEdge(5, 7) ➞ 11

nextEdge(9, 2) ➞ 10

Notes

(side1 + side2) - 1 = maximum range of third edge.

The side lengths of the triangle are positive integers.

1. A farmer is asking you to tell him how many legs can be counted among all his animals. The farmer breeds three species:

chickens = 2 legs

cows = 4 legs

pigs = 4 legs

The farmer has counted his animals and he gives you a subtotal for each species. You have to implement a function that returns the total number of legs of all the animals.

Examples

animals(2, 3, 5) ➞ 36

animals(1, 2, 3) ➞ 22

animals(5, 2, 8) ➞ 50

The order of animals passed is animals(chickens, cows, pigs). Remember that the farmer wants to know the total number of legs and not the total number of animals.

1. Create a function that takes in three arguments (prob, prize, pay) and returns true if prob \* prize > pay; otherwise return false. To illustrate, profitableGamble(0.2, 50, 9) should yield true, since the net profit is (0.2 \* 50 - 9), and 1 > 0.

Examples

profitableGamble(0.2, 50, 9) ➞ true

profitableGamble(0.9, 1, 2) ➞ false

profitableGamble(0.9, 3, 2) ➞ true

A profitable gamble is a game that yields a positive net profit, where net profit is calculated in the following manner: net\_outcome = probability\_of\_winning \* prize - cost\_of\_playing.

1. Create a function that takes a string, checks if it has the same number of x's and o's and returns either true or false. Return a boolean value (true or false). The string can contain any character and is not case sensitive (i.e. X is the same as x). When no x and no o are in the string, return true.

Examples

XO("ooxx") ➞ true

XO("xooxx") ➞ false

XO("ooxXm") ➞ true

// Case insensitive.

XO("zpzpzpp") ➞ true

// Returns true if no x and o.

XO("zzoo") ➞ false

1. Create a function that takes two numbers as arguments (num, length) and returns an array of multiples of num up to length. Array elements are positive integers.

Examples

arrayOfMultiples(7, 5) ➞ [7, 14, 21, 28, 35]

arrayOfMultiples(12, 10) ➞ [12, 24, 36, 48, 60, 72, 84, 96, 108, 120]

arrayOfMultiples(17, 6) ➞ [17, 34, 51, 68, 85, 102]