Homework #1

Due date: 10/14

Arithmetic and geometric series

Given three integers a, b, and c that are the initial term, second term, and last term, respectively, of both a finite arithmetic series and a finite geometric series, compute the sum of each finite series.

For example, let $a = 1, b = 3$, and $c = 27$.

Case 1: As terms of a finite arithmetic series
The common difference is $3 - 1 = 2$ and the sum of the finite arithmetic series is
$1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21 + 23 + 25 + 27 = 196$

Case 2: As terms of a finite geometric series
The common ratio is $3/1 = 3$ and the sum of the finite geometric series is
$1 + 3 + 9 + 27 = 40$

Requirements

1 You shall compute the sum of each finite series in two ways: one by formula and the other by accumulation.
Recall that the formula for the sum of the first n terms of an arithmetic series is

$$a_1 + a_2 + \cdots + a_n = \frac{n(a_1 + a_n)}{2}$$

and that of a geometric series is

$$a + ar + ar^2 + \cdots + ar^{n-1} = a\frac{1 - r^n}{1 - r}, \qquad r \neq 1$$

To this end, you shall write four functions, two for each series, and call them from the function **`main`**.

2 Write an interactive C program that is capable of handling multiple inputs.

3 You may assume that the inputs are correct.

4 Refer to the sample run for the required I/O format.

5 Do not use any technique that has not been taught so far. For example, don't use any library function to compute r^n. Instead, compute it by successive multiplications, i.e. $r^n = \underbrace{r \cdot r \cdot \cdots \cdot r}_{n\ times}$.

Sample run

```
Enter three integers: 1 3 27
Sum of the arithmetic series by formula      = 196
Sum of the arithmetic series by accumulation = 196
Sum of the geometric  series by formula      = 40
Sum of the geometric  series by accumulation = 40

Enter three integers: -1 -2 -1024
Sum of the arithmetic series by formula      = -524800
Sum of the arithmetic series by accumulation = -524800
Sum of the geometric  series by formula      = -2047
Sum of the geometric  series by accumulation = -2047

Enter three integers: -2 6 4374
Sum of the arithmetic series by formula      = 1197928
Sum of the arithmetic series by accumulation = 1197928
Sum of the geometric  series by formula      = 3280
Sum of the geometric  series by accumulation = 3280

Enter three integers: 7 77 77
Sum of the arithmetic series by formula      = 84
Sum of the arithmetic series by accumulation = 84
Sum of the geometric  series by formula      = 84
Sum of the geometric  series by accumulation = 84

Enter three integers: ^Z
```