

Programming Practice: Arithmetic Operations

1. Write a C program to input two integers **low** and **up**. Compute and output the result of the following summation: $\sum_{x=low}^{up} x^2 + 2x - 15$.

Program solution: `summation.c`.

2. Write a C program to input a positive integer and output all its positive factors. For example, if the input is integer 60, print the following output:

The positive factors of 60 are: 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60.

Program solution: `factors.c`.

3. Consider the following multivariate fractional polynomial:

$$f(x, y, z) = \begin{cases} 0 & \text{if } x = 0 \vee y = 0 \vee z = 0 \\ \frac{z^3 - 5xy}{x^2 + y^2 + z^2} + \frac{6(x^2y - yz^2)}{xyz} & \text{otherwise} \end{cases}$$

Write a C program to input floating point numbers **x**, **y**, and **z**. Compute and output the resulting value of $f(x, y, z)$. Print the result four digits after the decimal point. Repeat the program until the input of **x**, **y**, and **z** are all zero's. Program solution: `fractional_polynomial.c`.

4. Write a C program to input **double** type numbers **a**, **b**, **c**, **r1**, and **r2**, where **a**, **b**, and **c** are the coefficients of quadratic equation $ax^2+bx+c=0$. Test whether **r1** and **r2** are the roots of the quadratic equation. If both **r1** and **r2** are the roots, print a message as the following to confirm the roots:

```
Enter coefficient a: 1
Enter coefficient b: -1
Enter coefficient c: -6
Enter the first root r1: 3
Enter the second root r2: -2

3.0000 and -2.0000 are the roots of equation 1.0000 x**2 + -1.0000 x + -6.0000 = 0.
```

otherwise, print a message as the following message to deny the roots:

```
Enter coefficient a: 2
Enter coefficient b: -3
Enter coefficient c: 1
Enter the first root r1: 1
Enter the second root r2: 2

1.0000 and 2.0000 are not the roots of equation 2.0000 x**2 + -3.0000 x + 1.0000 = 0.
```

Program solution: `quadratic_equation_checker.c`.