3.2.4 Perform Calculations Using Python

Now that you are familiar with integers and floating-point decimal numbers, Tom is going to walk you through the process of performing simple and complex mathematical calculations in Python. Some mathematical operations will look familiar to you, but there are some operations that be new to you if don't have prior Python programming experience. Don't worry—you'll get the hang of it! Learning how to perform these mathematical operations is essential in programming, and Seth and Tom want to make sure you are comfortable using them in the election audit.

Many real-world coding programs require mathematical calculations like addition, subtraction, multiplication, and division. To perform these calculations in Python, several **arithmetic operators** are used. The following table lists these arithmetic operators, their meanings, and how they are used.

Operator	Meaning	Use
+	Adds two numbers.	*x* + *y*
–	Subtracts one number from another.	*x* – *y*
*	Multiplies two numbers.	*x* * *y*
/	Divides one number by another. This always results in a floating-point decimal number.	*x* / *y*
%	The “%” is known as the	*x* % *y*

	modulus. When used in place of "/" it will divide one number by another, and return the remainder of the division.	(remainder of *x*/*y*)
//	Divides one number by another and returns an integer. This is known as **floor division**.	*x* // *y*
**	Raises a number to a power.	*x***y* (*x* to the power *y*)

Order of Precedence

When you need to perform more complex mathematical expressions that include any combination of division, multiplication, addition, and subtraction, you must follow the **order of precedence (operations)** for arithmetic operators. The order of precedence in Python, which follows the same guidelines as in mathematics, is:

1. Operations enclosed in parentheses are performed first.
2. Exponentiations (i.e., raising a number to a power) are performed next.
3. Multiplication and division operations are performed from left to right: *, /, //, and %.
4. Finally, addition and subtraction operations are performed from left to right.

SKILL DRILL

In the Python interpreter, evaluate the following mathematical expressions:

1. 5 + 2 * 3
2. 8 // 5 - 3
3. 8 + 22 * 2 - 4
4. 16 - 3 / 2 + 7 - 1
5. 3 ** 3 % 5
6. 5 + 9 * 3 / 2 - 4

Grouping with Parentheses

In a mathematical calculation, you can group expressions in parentheses to indicate that those expressions should be performed before operations there are **not** in parentheses.

Treat these calculations just like algebraic expressions: if parentheses are enclosed within parentheses, work from the inside out.

SKILL DRILL

In the Python interpreter, evaluate the following mathematical expressions and compare them with the answers in the previous exercise.

1. (5 + 2) * 3
2. (8 // 5) - 3
3. 8 + (22 * (2 - 4))
4. 16 - 3 / (2 + 7) - 1
5. 3 ** (3 % 5)
6. Finally, compare the following: 5 + (9 * 3 / 2 - 4) and 5 + (9 * 3 / (2 - 4))

© 2020 - 2022 Trilogy Education Services, a 2U, Inc. brand. All Rights Reserved.