Python Lecture 3: More about variables and types, and arithmetic operations

Initializing variables

- Variables can be created on the fly and at any time
- No need to declare the type before
- Usually, value is assigned whenever a new variable is created
- However, it is possible to create variables without initializing

Imprecision in Floating-Point Numbers

- Is 1.1 + 2.2 == 3.3?
- Try it out on Python, and you may be surprised
- Python stores decimal fractions as binary digits
- Due to limitation of the hardware, the decimal fractions cannot be accurately stored
- Use the **decimal** module, if you need to do precise calculations

Assignment Compatibilities

- Python is dynamically typed, so assignment of values of different types can happen any moment
- But be careful from converting **float** to **int**
- Keep track of your variable names
- Try not to reuse variable names for the same purpose in the same program

Arithmetic Operators

- a + b, addition
- a - b, subtraction
- a * b, multiplication
- a / b, division
- a ** b, b is exponent of a
- a // b, a divided by b, but the result is floored

Mixing Types in Arithmetic

- If two operands are integers, the result is also an integer, the type remains integer
- If one of the operands is a float, the resultant will become float

Order of operations: PEMDAS

- P, First Parentheses
- E, then Exponent
- MD, then multiplication or division, left to right
- AS, then addition and subtraction, left to right

The mod operator

- The mod (%) operator is used with operators of integer type to obtain the remainder after integer division.
- 11 divided 4 is 2 with a remainder 3. Hence,
  - 11 % 4 is 3.
- The mod operator has many uses, including
  - determining if an integer is odd or even
  - determining if one integer is evenly divisible by another integer.

Compound assignment

There are five compound assignment operators in Python -

- +=
- -=
- *=
- /=
- //=

Fake ++ or -- in Python

- In some languages, ++ or -- is used to denote increment or decrement
- In Python, they are treated as unary operations
- “- - ” is not decrement by 1
    - It means, double negation. So there is no change in value.