Math 2300: Discrete Mathematics
Introduction to Python 1 - Variables and Operators Textbook Section

Terms, Concepts, and Examples

We use the Python 3 programming language. It is popular in both academia and industry and was designed with education in mind.

- We categorize information using **data types**. The three main data types we focus on n Discrete Mathematics are: **int, boolean,** and **string**.

    1. int - represents integer values, namely whole numbers without a decimal point

    2. boolean - have only two possible values, True or False

    3. string - text values (sequences of characters) including punctuation, symbols, and whitespace

- **Variables** are (virtual) boxes that store values for use later. A variable has a name and a current value. Each variable can only hold one value at a time. The $=$ is used in Python to assign values to variables.

    Video Example of Variables

- **Operators** are special symbols that designate some sort of computation that should be performed. A sequence of operands and operators, like $a + b - 5$, is called an **expression**. Some common operators include: $+ =$ the increment operator, $//$ floor division, and $\%$ the mod operator

    Example:

    ```
    d = 7 // 2
    m = 7 % 2
    a += 1
    ```

    Solution: In the above code, d stores 3 since integer division always gives ints as values. m stores 1, since it is the mod operator or the remainder of the division. And$+ =$ increments the value of a by 1 (to 6).

    Refer to the MATH 2300 Python Syntax Example sheet

    Video Example of Operators

- When you compare two items you can only return two values, True or False, we call these **Boolean operators** (or comparison operators). Some examples include: $==$ equal, $! =$ not equal, $>$ greater than.

    Example:

    ```
    a = (3 \leq 6)
    b = (3 != 2)
    c = (4 == 3)
    ```

Solution: In the above code, a stores True since 3 is less than or equal to 6. b stores True since 3 is not equal to 2. And c stores False since 4 is not equal to 3.

Video Example of Boolean Variables

Video Example of Boolean Operators

- Use the **print function** print() to output text on a screen. Variables and values can be outputs, along with words using strings.

  Example:

  ```
  z = "Hi there!"
  print(z)
  ```

  Solution: In the above code, z stores a string value. The output displayed by this code would be "Hi there!"

Practice Problems

1. Given the following Python code, complete the table listing the value of each variable and its data type.

   ```
   a = 5 + 7
   big = a // 3
   c = 11 // 3
   d = 11 % 3
   e = True or False
   f = False and True
   goose = (False or (a > 10))
   ```

Variable	Value	Data Type
a		
big		
c		
d		
e		
f		
goose		

2. Given the following Python code, determine the printed output. (You can enter this in Python tutor to check your answer.)

   ```
   print("Hello World!")
   a = "The answer is"
   b = 6 * 7
   print(a, b)
   print(False, "Hobbit", 1, "Ring")
   ```