Introduction to Python Programming Notes

Data - any alphanumeric input or output from the computer
- any information stored in the computer's memory

Command - an instruction for the computer

Program - a series of commands which are executed to accomplish a task.

Function - similar to a command except it has round brackets that must contain data
- an example is **print** (“Hello World”)

Types of Data in Python

1. **Integer** - numbers without decimals
- examples include 4, -234

2. **Floats** - short for “floating point numbers”
- numbers with decimals
- examples include 4.67, -123.56, 56.0
- another example is 52.3E+4 (the E indicates powers of 10). In this case, 52.3E+4 means $52.3 * 10^4$

3. **String** - characters or numbers or special symbols
- must be enclosed in quotation marks in programs
- cannot be used in mathematical operations
- ex. "Hello", "123 King St."

Variables

The real power of programming is when the **user** can input data into the computer. This data is stored in the computer and can be processed (calculated) and outputted.

When data is stored in the computer, it is assigned to a **variable**. A variable is defined as:

1) a storage spot
2) for one piece of data
3) which can be changed at any time.

Since there are three types of data, there are three types of variables.

1) integer variables
2) float variables
3) string variables

Rules for Variable Names

1. A variable name must be one word (no spaces).
2. A variable name cannot contain some special symbols. Use letters and numbers to avoid confusion (except the underscore).
3. A variable name cannot begin with a number.
4. A variable name should describe the data it stores.
5. Program commands are reserved which means that they cannot be used as variable names.
6. The name of variables should begin with a lowercase letter. The first letter of the 2nd and subsequent words are capitalized to improve readability.

Examples of proper variable names:

number numberOne usersFirstName

Declaring a Variable

When a variable is used in a program, it must be **declared** (created) before it is used. Declaring a variable tells the computer:

1. the name of variable
2. what type of variable it is (integer, float or string)

In Python (unlike most computer languages), the computer will automatically declare an appropriate variable when it is **assigned** (given) a value.

Assigning Values to Variables

Assigning a value to the variable means putting a specific value in the variable. To assign a value to a variable the "assign" symbol (=) must be used.

Examples of Assigning Data

```
userName = "John Smith" # Declares a string variable and stores the value "John Smith"
firstNum = 12           # Declares an integer variable and stores the value 12
average = 67.6          # Declares an float variable and stores the value 67.6
```

Variables can also be used to store information that has been processed (calculated) by the

computer. This is also is called assigning a value to a variable.

More Assigning Examples

sum = 12 + 9 *# Declares an integer variable and stores 21*

total = num1 * num2 *# Declares a variable - the type depends on what type num1 and num2 are.*
 # It stores the product of the values in num1 and num2

The input () Function

The input () function tells the computer to stop executing the program and allow the user to input data into the computer. When the user is finished inputting the data, he/she presses the Enter key. The computer then continues executing the program. Note that all data inputted is automatically assumed to be string data.

Example of code to have the user input data

name = **input** (“Please enter your name: ”)
 # Allows the user to input string data into the variable called name

The good programmer will have the computer "**prompt**" or ask the user for the data. The prompt is the data inside the brackets.

Inputting Integer and Float Data

Since the input function assumes all data is string, a programmer must use the **int ()** or **float ()** functions along with the input () function to get integer or float data from the user.

Example of code to input integer data

age = **int (input** (“Please enter your age: ”))
*# Allows the user to input data into the computer. The data is converted to integer data with the **int** function. **age** is an integer variable*

Example of code to input float data

average = **float (input** (“Please enter your average: ”))
*# Allows the user to input data into the computer. The data is converted to float data with the **float** function. **average** is a float variable.*