**Java Data Types and Variables**

Java has eight primitive data types. A *primitive* data type is a data type that cannot be broken down into simpler data types. They are also pre-defined by the Java language, and not as part of a built-in library. These data types are always all lowercase.

* Integer data types
  + **byte**: holds integers from -128 to 127 (inclusive)
  + **short**: holds integers from -32,768 to 32,767 (inclusive)
  + **int**: holds integers from -2,147,483,648 to 2,147,483,647 (inclusive)
  + **long**: holds integers from -263 to 263-1 (inclusive) [integers with up to 18 digits]
  + These strange limits come from the number of bytes reserved for variables of each data type in the Java language: 1 byte, 2 bytes, 4 bytes, and 8 bytes, respectively.
  + Most people recommend using int as your default integer data type, and long where you think you might need the extra space. byte and short are rarely used in practice, except to save memory in large arrays.
* Floating-point data types
  + **float**: holds roughly any decimal number with roughly 6-7 significant figures. [4 bytes]
  + **double**: holds roughly any decimal number with roughly 14-15 significant figures. [8 bytes]
  + Most people recommend using double as your default floating-point data type. float is often used when allocating large arrays when saving memory is important.
* Boolean data type: **boolean**. Can only be assigned true or false as values.
* Character data type: **char**. Can represent any single character. Character literals must be enclosed in single quotes, like **'**a**'** or **'**\***'** or even **'** **'** (a space character).
* Note that strings are *not* primitive data types in Java; they are reference data types. You can remember this because the **String** data type is capitalized.

Java, being a statically-typed language, requires that variables be *declared* before they can be used. A variable is declared by stating the type and the name of the variable:  
  
**int numDogs;**  
A variable may optionally also be initialized when it is declared:  
  
**int numDogs = 2;**  
If a variable is *not* initialized when it is declared, it is assigned a default value. The default for numeric types is 0, false for Booleans, and the “empty character” for char.

After a variable is declared, it can be assigned to (and therefore changed) similarly to how it is done in Python:  
  
**numDogs = 5; // Note that when simply assigning to a variable, the type is not used.**  
Aside from declaring a variable’s type before it can be used, variables work similarly to how they do in Python.

Java’s naming convention is slightly different than Python’s; you will usually see variables in camelCase rather than using underscores to separate words.