Python to Java

Here is a quick tour of the differences between Python and Java. We will give more details on these over the next few classes.

1. Java is explicitly *typed*.

A *type* is a name that tells the system what values are possible for an object and what operations can be performed on it. Classes are types. There are also *primitive* or built-in types. Every variable in Java must be given a type before it can be used. Every method must have an explicit *return-type* (including void if the method doesn't return anything).

2. Classes, variables, and methods in Java have *access attributes* that determine who is allowed to access them. At one extreme you can say that a variable is *public* and every part of the program can see or alter it. At the other extreme you can say it is *private* and only elements of its class can see it. There are also several levels in between public and private.

3. A program in Java is just a collection of classes, one of which contains a method called main( ). Python is essentially a scripting language; each statement can be executed on its own. Java is much more formal. All Java code must be inside a class.

Here is a typical Java program:

```
public class Tester {
        int factorial(int n) {
                if (n  < 1)
                        return 1;
                else
                        return n*factorial(n-1);
        }
        public static void main(String args[ ] ) {
                int num = 6;
                int answer;
                answer = factorial(num);
                System.out.println(answer);
        }
}
```

4. In Java you need to explicitly throw and catch exceptions. Python allows you to do this with try-except statements. In many situations Java requires you to do this; your code won't run without it.

5. Java ignores white space.

Python forces you to write well-formatted code. Java will let you write stupidly-formatted code while it sits there and laughs at you.

Consider

```
size = "big";
if (x < 10)
        digits = 1;
        size = "small";
```

In Python, if *x* has the value 500 variable *size* ends up at "big". In Java it ends up at "small" because that last line isn't part of the if-statement even though you formatted it that way.

In Java that chunk of code should probably be written

```
size = "big";
if (x < 10) {
        digits = 1;
        size = "small";
}
```

6. For-loops in Java look really clunky.

Python has a great, flexible for-loop construct. Java uses the construct that has been around since C was developed in the early 1970's.

Here is a typical for-loop, which sums the numbers from 1 to n:

```
int sum = 0;
for (int i = 1; i <= n; i++)
        sum = sum + i;
```

7. Java makes a lot of use of *arrays* which are fixed-size blocks of data. Python uses lists, which are much more sophisticated, in place of arrays. In Lab 2 we'll implement lists in terms of arrays.

8. Java does not distinguish between terminal I/O and file I/O, which means that even simple operations like printing a value to the screen are more complex. Here is a basic print statement in Java:

```
System.out.print( foo );
```

9. Java has much more documentation than Python and you need to refer to it more often. You can find almost anything you need by googling the name of a class, with a search string such as

java class Scanner

One of the first hits for such a search will be the standard documentation from Oracle for this class.