Class exercises Week 8 – answers

1. Which of the following is an example of a strong typing and which is an example of weak typing? Explain why?

Example 1: Strong Typed

```
/* Python code */
>>> foo = "x"
>>> foo = foo + 2
Traceback (most recent call last):
  File "<pyshell#3>", line 1, in ?
    foo = foo + 2
TypeError: cannot concatenate 'str' and 'int' objects
>>>
```

Programming languages in which variables have specific data types are strong typed. This implies that in strong typed languages, variables are necessarily bound to a particular data type. Python is strong typed, and so is Java. The distinction between strong typing and weak typing is more subtle and thus more difficult to grasp than is the distinction between static typing and dynamic typing.

In the above Python example (run from the Python shell), foo is of str type. In the second line, we're attempting to add 2 (an int) to a variable of str type. As we can see, a TypeError is returned, indicating that a str object cannot be concatenated with an int object. This is what characterizes strong typed languages: variables are bound to a particular data type.

Example 2: Weak Typed

```
/* PHP code */
<?php
$foo = "x";
$foo = $foo + 2; // not an error
echo $foo;
?>
```

As opposed to strong typed languages, weak typed languages are those in which variables are not of a specific data type. It should be noted that this does not imply

that variables do not have types; it does mean that variables are not "bound" to a specific data type. PHP and C are examples of weak typed languages.

In this example, foo is initially a string type. In the second line, we add this string variable to 2, an integer. This is permitted in PHP, and is characteristic of all weak typed languages.

Now that we know about the two concepts, we can augment both of them to characterize any given language. Thus, Python is dynamic typed and strong typed; Java is static typed and strong typed; PHP is dynamic typed and weak typed; C is static typed and weak typed (owing to its casting ability).

2. What is good about dynamic typing?

In a dynamic typed language, you don't have to initialize variables, which is a big bonus for many developers. Programmers like the fact that you can use a variable at will when required (without having to initialize it). Dynamic typing is characteristic of many of the scripting languages: Perl, PHP, Python, etc. Dynamic typing, in fact, does save you from writing a few "extra" lines of code, which, in turn, means less time spent writing code.

3. The following is an example from a dynamically typed language (Python). Why in this example, is dynamic typing a problem?

```
1.  /* Python code */
2.  my_variable = 10
3.  while my_variable > 0:
4.          i = foo(my_variable)
5.          if i < 100:
6.                  my_variable++
7.          else
8.                  my_varaible = (my_variable + i) / 10 // spelling error intentional
```

As you can see in the above code, my_varaible is a spelling mistake that the programmer could have very well made. The problem here is that, since Python is dynamically typed, it will not return an error, but instead will create a new variable called my_varaible. So, now we have two variables: my_variable and my_varaible. This obviously is a serious problem; some would suggest that forced variable declaration is an important requirement in any programming language.