CSE 3302 Assignment 1

Due: 9 Sep 2010, 9:30am

Please hand in a hard copy at the beginning of class on the due date. Type or write neatly. I will not grade assignments I cannot read. Late assignments are not accepted.

1. [4 pts] Languages can be either statically or dynamically typed. In statically typed languages, type errors (e.g., assigning a string into a integer variable, adding a boolean to a float) are caught at compile time; in dynamically typed languages, type errors are caught at run-time. What are some advantages and disadvantages of each approach.

2. [8 pts] Classify the following languages as either statically or dynamically typed and as either strongly typed or weakly typed: Fortran, LISP, Objective C, Modula-3, Groovy, F#, Haskell, PHP. You can easily find descriptions of the languages online. Cite your sources.

3. [8 pts] In Java and many other OO languages, methods are virtual, but fields are not. That is, the actual method body selected by a call depends on the dynamic type of the receiver, whereas the memory location selected by a field access depends on the static type of the target object.

   (a) Why do you think this design choice was made?
   (b) Consider the following Java class declarations:

```java
class A {
    final int f = 0;
    int m() { return f; }
}
class C extends A {
    final int f = 1;
    int m() { return f; }
}
```

Given the following variable declarations:

```java
A a = new A();
A b = new C();
C c = new C();
```

What value is returned by a.f? b.f? c.f? What value is returned by a.m()? b.m()? c.m()?