CSE305, Fall 2007   Assignment 1   Due Wed. Sep. 5, in class

This is a "mini" assignment—later ones will have 60–90 points or so. Please submit *in hardcopy only*, just before class starts next Wednesday. (Instructions for on-line submission of later assignments will be given next week.) Over the weekend, please read Chapter 2 of the text—this is for expository background reading only. No "trivia" from these languages will be required knowledge, but you should think about the role played by each language in lessening the conceptual distance between "what we want" and "what we get," per the diagram on sheet 1.5 of my notes. For next week, read sections 3.1–3.3 of the Sebesta text—I *may* introduce the topic in Friday's lecture if time allows.

(1) Toward the bottom of page 11, as an example of "non-orthogonality," Sebesta writes that in C that `structs` "can be returned from functions but arrays cannot." Drawing on your knowledge of C++ and Java, give the sense in which this statement is true and two senses in which it is false. You need to know that a `struct` in C++ is technically almost the same as a class, and to observe the following difference in semantics between class objects in C++ and Java:

```
b.setKey(3);
a = b;
a.setKey(4);
return b.getKey();
```

In C++ the assignment `a = b;` copies fields by value, so resetting `a` does not affect the key value 3 of `b`. In Java, however, it copies a pointer to the class object referenced by `b`, making them aliases, so the next line changes the returned key value to 4. That is, records/objects in C/C++ obey "by-value" semantics whereas in Java everything other than the primitive types obeys "by-pointer" semantics. Finally, native arrays in C/C++ obey by-pointer semantics. Indeed, the name of an array is formally identical to a pointer to the array's first element.

    For the two false senses, then, draw on your experience with Java to explain the understanding by which arrays and by-pointer objects are returned from methods. Give some other code-fragment examples to support your reasoning. (3+9+9+9 = 30 pts. total for this essay question)