CSE 341 — Imperative Languages and Memory Management Discussion Questions

(plus a stray coercion question)

1. Suppse we have the following Java declarations:

   ```
   double d1, d2;
   float f1, f2;
   int i1, i2;
   short s1, s2;
   ```

   Consider the following Java statements. Which are legal, and which give compile-time errors? Which will cause Java to insert a coercion?

   ```
   i1 = i2+30;

   i1 = s1+30;

   s1 = i1+50;

   d1 = s1;

   d1 = d2+100.0;

   s1 = d1;

   f1 = d1+3.14;

   d1 = f1;
   ```

2. Consider the following program in an Algol-like language.

   ```
       begin
       integer n;
       procedure p(k: integer);
           begin
           n := n+100;
           print(k);
           end;
       n := 0;
       p(n);
       end;
   ```

   What is printed if n is passed by value? By reference?

3. Consider the following Java classes.

```
class Octopus {
  public static void main(String[] args) {
  int i = 42;
  int[] a = new int[3];
  int k;
  k = test(i,a);
  }

  public int test(int m, int[] n) {
    n[0] = m;
    return 100;
  }
}
```

Draw a picture of Java's memory structure when main is invoked, and then when test is invoked. Include both the stack and the heap.

4. Do the same thing for these classes:

```
class IntHolder {
  public int myint;
  public String description;
}


class Octopus {
  public static void main(String[] args) {
  Octopus o = new Octopus();
  IntHolder t;
  t = o.create_holder(28,"a perfect number");
  }

  public IntHolder create_holder(int n, String s) {
    IntHolder h = new IntHolder();
    h.myint = 28;
    h.description = s;
    return h;
  }
}
```