# Homework

# Programming Tracing

1. Trace through the following code segments and illustrate the output and memory.

|  | **Memory** | **Output** |
| --- | --- | --- |
| int a = 3;  int b = 9;  System.out.println(b);  a = b + 2;  a = a + b;  System.out.println(b+3);  System.out.println(a); | a (int): ~~3~~ ~~11~~ 20  b (int): 9 | 9  12  20  > |
| int ans = 10;  int res = 6;  int num;  num=ans + res;  System.out.println(num + 2);  res=num + 3;  System.out.println( res); | ans (int): 10  res (int): ~~6~~ 19  num (int): 16 | 18  19  > |
| int a, b, c;  double d, e, f;  a = 10;  b = 4;  d = a;  c = a / b;  e = a / b;  f = e / b;  a = a + 2 \* b;  d = b – d \* 2;  System.out.println(a);  System.out.println(b);  System.out.println(c);  System.out.println(d);  System.out.println(e); | a (int): ~~10~~ 18  b (int): 4  c (int): 2  d (double): ~~10.0~~ -16.0  e (double): 2.0  f (double): 0.5 | 18  4  2  -16.0  2.0 |

1. To switch the values contained in the variables x and y, a programmer wrote the following segment:

x = y;

y = x;

* 1. If, before execution of the segment, x contains the value 7 and y contains the value 4, what value would each have after the segment was performed?

After execution, both x and y would be 4.

**Hint:** Remember that a computer can only do ONE instruction at a time!  
Try doing a trace of the above steps. What’s the problem? Did it do what the programmer wanted it to do?

Since it runs the code sequentially, the first line set x to y, which is 4, so now x = 4. So when the next line sets y to x, which is 4, it sets y to 4 instead of the intended 7.

* 1. Rewrite the segment so that it performs the intended task correctly.  
     Try to do it WITHOUT hard-coding any values.  
     (In other words, DON’T do x = 4; or y = 7;)

int x = 7;

int y = 4;

int z;

z = x;

x = y;

y = z;

Reference for questions 2

Carter, John. An Introduction To Computer Science Using Java. Toronto: University of Toronto Press, 2003