Homework

Programming Tracing

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

	Memory	**Output**

a)
`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
		>

b)
`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
		>

c)
`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): 0.625
		18
		4
		2
		-16.0
		2.0
		>

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

```
x = y;
y = x;
```

a) 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?
x = 4
y = 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?

No, firstly x was set to y's value which is 4, then y is set to x's *current* value which is also 4.

b) 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 a = x;
x = y;
y = a;
```

Reference for questions 2
Carter, John. An Introduction To Computer Science Using Java. Toronto: University of Toronto Press, 2003