

CSE115 Introduction to Computer Science I

Quiz #2 Retrospective

Fall 2017

In this quiz we asked you to study some code and then answer some questions.
The given code was:

```
01  public String serumProtein(double reading, int trimester) {
02      String result = "error";
03      if ( trimester == 1 ) {
04          if ( reading < 6.2 ) { result = "low"; }
05          else {
06              if ( reading < 7.6 ) { result = "normal"; }
07              else { result = "high"; }
08          }
09      }
10      if ( trimester == 2 ) {
11          if ( reading < 5.7 ) { result = "low"; }
12          else {
13              if ( reading > 6.9 ) { result = "high"; }
14              result = "normal";
15          }
16      }
17      if ( trimester == 3 ) {
18          if ( reading < 5.6 ) { result = "low"; }
19          else {
20              if ( reading <= 6.7 ) { result = "normal"; }
21              else { result = "high"; }
22          }
23      }
24      return result;
25  }
```

QUESTION 1: *serumProtein(7.6,1) should produce "normal".
What value does it produce?*

To answer this question we again simulate the method call by tracing its execution. First the arguments, 7.6 and 1, are assigned to their corresponding parameters, reading and trimester.

Executing the instructions in the body of the method in order, we first assign "error" to the variable result:

```
String result = "error";
```

Next, we move on to the next statement, which is an if statement:

```
if ( trimester == 1 ) {
    if ( reading < 6.2 ) { result = "low"; }
    else {
        if ( reading < 7.6 ) { result = "normal"; }
    }
}
```

```
        else { result = "high"; }  
    }  
}
```

The first thing we do is evaluate the condition for the if statement that begins on line 03:

```
trimester == 1
```

Since the variable trimester does have value 1, execution enters the then-clause of the if statement:

```
if ( reading < 6.2 ) { result = "low"; }  
else {  
    if ( reading < 7.6 ) { result = "normal"; }  
    else { result = "high"; }  
}
```

Evaluating the condition `reading < 6.2` yields false since the value of reading is in fact 7.6. Therefore control flows to the else clause, which contains a single if-else statement.

```
if ( reading < 7.6 ) { result = "normal"; }  
else { result = "high"; }
```

We again first evaluate the condition,

```
reading < 7.6
```

Since reading has value 7.6, and since 7.6 is not strictly less than 7.6, this expression is false. We therefore go on to the else clause again:

```
result = "high";
```

Execution continues with the next statement, which is another if statement:

```
if ( trimester == 2 ) {  
    if ( reading < 5.7 ) { result = "low"; }  
    else {  
        if ( reading > 6.9 ) { result = "high"; }  
        result = "normal";  
    }  
}
```

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The condition, `trimester == 2`, is false. Therefore execution moves to the next statement, another if:

```
if ( trimester == 3 ) {  
    if ( reading < 5.6 ) { result = "low"; }  
    else {  
        if ( reading <= 6.7 ) { result = "normal"; }  
        else { result = "high"; }  
    }  
}
```

We again evaluate the condition, `trimester == 3`, which is again false. Execution moves on to the next statement:

```
return result;
```

Executing a return statement terminates the method call, and returns the value of the expression `result`, which is "high".

QUESTION 2: *Give the line number(s) for the incorrect line(s), AND re-write incorrect line(s) of code to fix.*

The code is incorrect on line 06. The line should be (code change highlighted in red):

```
if ( reading <= 7.6 ) { result = "normal"; }
```

QUESTION 3: *serumProtein(7.0,2) should produce "high".
What value does it product?*

To answer this question we again simulate the method call by tracing its execution. Shortening the explanation somewhat, we can see that because trimester has value 2 it is the following if statement that is executed:

```
if ( trimester == 2 ) {  
    if ( reading < 5.7 ) { result = "low"; }  
    else {  
        if ( reading > 6.9 ) { result = "high"; }  
        result = "normal";  
    }  
}
```

Because reading has value 7.0 the expression `reading < 5.7` is false. Execution flows to the else clause, which contains:

```
if ( reading > 6.9 ) { result = "high"; }  
result = "normal";
```

Because reading has value 7.0 the expression `reading > 6.9` is true. The then clause is executed, and result is assigned the value "high". (So far this looks good!) However, execution continues with the next statement, which is

```
result = "normal";
```

This is the value that eventually is returned by the method.

QUESTION 4: *Give the line number(s) for the incorrect line(s), AND re-write incorrect line(s) of code to fix.*

The error is on line 14. This should be part of an else clause, as in:

Remember that the bug fix is highlighted in red.

```
else { result = "normal"; }
```
