Quiz 1 Results

20 Points possible
Mean: 10.2
Min: 4
Max: 17
Median: 9.75

Problem 1

What are the values of a and b after the following statements have been executed?

```java
int a = 7;
int b = 5;
a = b++;
a = _5_ b = _6_
```
Problem 2

Circle each of the following that is a legal identifier:

A. anInt Yes
B. Integer Yes
C. Int No – int is a keyword
D. Int Yes
E. someThing Yes
F. some-thing No – minus sign is not allowed
G. some$thing Yes
H. $3 Yes - $ is valid Java letter

Identifiers start with a Java letter, followed by Java letters or digits
- Java letters: A-Z, a-z, $, _
- Can’t use a keyword or true, false, or null
- Case sensitive

Problem 3

In Java, what is the value of the following expression?

\[ 3 + 5 * 7 / 2 = \]
\[ 3 + ((5 * 7) / 2) = \]
\[ 3 + (35 / 2) = \]
\[ 3 + 17 = \]
\[ 20 \]

Problem 4

What is printed by the following statement?

```java
System.out.println("She said, \n"Eat your dinner\n");
```

She said, "Eat your dinner"
Problems 5 and 6

5. The Java program files that you create with an editor are called _______ files?
   A. bytecode  B. main  C. binary  D. source  E. executable
   – Answer: source

6. The files produced by javac are called _______ files?
   A. bytecode  B. main  C. binary  D. source  E. executable
   – Answer: bytecode

• See page 17 of the text

Problems 7 – 13

// HelloWorld2.java - simple variable declarations
class HelloWorld2 {
    public static void main( String[] args ) {
        String word1;            // declare a String variable
        String word2, sentence;  // declare two more
        word1 = "Hello, ";
        word2 = "world!";
        sentence = word1.concat(word2);
        System.out.println(sentence);
    }
}

7. What is HelloWorld2? identifier or type
8. What is String? type
9. What is sentence? variable
10. What is //declar two more? comment
11. What is concat? identifier
12. What is class? keyword
13. What is "world!"? literal

Question

• Why does converting the int 123456789 to a float result in a value of 123456792?
  – Page 32, section 2.10.2 of text
• What is the size of an int (how may bits)?
• What is the size of a float?
Integers and Floats

- An integer is represented with 32 bits
  - Each bit pattern is used for a distinct value
  - $2^{32} = \text{approx} \ 4.2 \ \text{billion}$
  - so int ranges from approx $-2.1 \ \text{billion}$ to $+2.1 \ \text{billion}$
- A float is also represented with 32 bits
  - But, its values range from $+/-10^{-45}$ to $+/-10^{45}$
  - So, many more values in the same size
  - Need to approximate, or round off

Round-Off Example

```java
class RoundOff {
    public static void main(String[] args) {
        int value = 123456789;
        float floatValue = value;
        System.out.println("Integer: "+ value);
        System.out.println("Float: "+ floatValue);
    }
}
```

This program prints:

Integer: 123456789
Float: 1.23456792E8

Logical Operators

- Logical operators work with boolean operands
  - && AND a && b
  - || OR a || b
  - !NOT !a
Truth Tables

**AND**

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>A &amp;&amp; B</th>
</tr>
</thead>
<tbody>
<tr>
<td>FALSE</td>
<td>FALSE</td>
<td>FALSE</td>
</tr>
<tr>
<td>FALSE</td>
<td>TRUE</td>
<td>FALSE</td>
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<td>TRUE</td>
<td>FALSE</td>
<td>FALSE</td>
</tr>
<tr>
<td>TRUE</td>
<td>TRUE</td>
<td>TRUE</td>
</tr>
</tbody>
</table>

**OR**

| A    | B    | A || B |
|------|------|------|
| FALSE| FALSE| FALSE|
| FALSE| TRUE | TRUE |
| TRUE | FALSE| TRUE |
| TRUE | TRUE | TRUE |

**NOT**

<table>
<thead>
<tr>
<th>A</th>
<th>!A</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRUE</td>
<td>FALSE</td>
</tr>
<tr>
<td>FALSE</td>
<td>TRUE</td>
</tr>
</tbody>
</table>

Logical Operations: Examples

**Example 1**

```java
int x, y;
boolean b;
x = Console.in.getInt();
y = Console.in.getInt();
b = (x == y);
System.out.println(b);
```

**Example 2**

```java
boolean b = ((age >= 18) && (age < 65));
System.out.println("Full Fare Adult: " + b);
b = ((age < 18) || (age >= 65));
System.out.println("Eligible for reduced fare: " + b);
```

Logical Operations

- **What if?**
  ```java
  b = ((age >= 18) || (age < 65));
  ```

- **What if?**
  ```java
  b = ((age < 18) && (age >= 65));
  ```

- **Is this legal?**
  ```java
  b = (18 < age <= 65);
  ```
Precedence and Associativity

<table>
<thead>
<tr>
<th>Operators</th>
<th>Associativity</th>
</tr>
</thead>
<tbody>
<tr>
<td>( ( ) )</td>
<td>left to right</td>
</tr>
<tr>
<td>++ (postfix)</td>
<td>left to right</td>
</tr>
<tr>
<td>-- (postfix)</td>
<td>right to left</td>
</tr>
<tr>
<td>+= - (unary)</td>
<td>right to left</td>
</tr>
<tr>
<td>*= / %</td>
<td>left to right</td>
</tr>
<tr>
<td>+= ++</td>
<td>left to right</td>
</tr>
<tr>
<td>-= --</td>
<td>left to right</td>
</tr>
<tr>
<td>&lt; &lt;= &gt; &gt;=</td>
<td>left to right</td>
</tr>
<tr>
<td>== !=</td>
<td>left to right</td>
</tr>
<tr>
<td>&amp;&amp;</td>
<td>left to right</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>= += -= /= etc.</td>
<td>right to left</td>
</tr>
</tbody>
</table>

Boolean Expressions

- Be careful
  - !a & & b is not the same as !(a & & b)
  - !a || b is not the same as !(a || b)

Conditional Statements

- Now that we have seen:
  - Booleans
  - Relational operations
  - Logical operations
  - Expression statements
  - Block statements
  - Empty statements
- We can talk about conditional statements
Conditional Statements

- 5 types of conditional statements
  - `if` statement
  - `if-else` statement
  - `while` statement
  - `for` statement
  - `switch` statement
- These statements conditionally take an action depending upon the value of a boolean expression

If Statement

- Decide whether or not to execute a particular statement
  - Execute a particular statement only if a given boolean expression is true
  - `if` (<boolean expression>)
    - `<statement>`
- If the boolean expression is true, the *then statement* is executed, otherwise it is not

Flowchart for the If Statement
If statement in action

```java
if ( temperature > 100 )
    System.out.println("It's hot!");

if (count != 0)
    average = total / count;

if (itemPrice < 100) && (cashOnHand > itemPrice) {
    purchase(item);
    cashOnHand -= itemPrice;
}
```

Let's try it!

- Remember our earlier example:
  ```java
  boolean b = ((age >= 18) && (age < 65));
  System.out.println("Full Fare Adult: " + b);
  b = ((age < 18) || (age >= 65));
  System.out.println("Eligible for reduced fare: " + b);
  ```

- Let's write a program that uses if to only print out the appropriate message:
  - Print "Full Fare Adult" if age is between 18 and 65
  - Print "Reduced Fare" if age < 18 or age > 65