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++;
```

\[ a = 5 \quad b = 6 \]

Problem 2

Circle each of the following that is a legal identifier:

A. anInt Yes
B. intanYes 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 a 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?

\[ 3 + 5 * 7 / 2 = \]

\[ 20 \]

3 + ((5 * 7) / 2) = // Precedence and Associativity
3 + (35 / 2) = // Integer division
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

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 = approx 4.2 billion
  – so int ranges from approx -2.1 billion to +2.1 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

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>
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<td>TRUE</td>
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<td>FALSE</td>
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<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>() ++(postfix) --(postfix)</td>
<td>Left to right</td>
</tr>
<tr>
<td>+(unary) -(unary) ++(prefix) --(prefix)</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>&lt; &lt;= &gt;= !=</td>
<td>Left to right</td>
</tr>
<tr>
<td>&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
  ```java
  !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
  \[
  \text{if} \ (\ <\text{boolean expression}>\ ) \\
  \text{<statement>}
  \]
- 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