Lecture 9: Conditionals Worksheet

1) What is the value returned by the following expressions?

\[(2 + 5) \times (6 - 4) \quad 2 + 5 \times 8 \quad \max(1/2, \min(-1\times3, 1-3)) \quad 9 / 3 > 1 + 2 \quad 0.5 \neq -0.5 \quad 'h' \quad \text{==} \quad 'H'\]

2) What is the data type of the value returned by the following expressions? Assume the variables \(x\) and \(y\) are defined as \texttt{float}. Check the Processing Reference (online) for functions that you don’t know.

\[
sqrt(x) \quad \text{abs}(x) \neq \text{sq}(y) \quad !\text{false} \quad \text{floor}(0.1 \times y)\]

3) The modulus operator \((x \% y)\) returns the remainder of \(x\) divided by \(y\). What value is returned by the following expressions?

\[
0 \% 3 \quad 6 \% 3 \quad -2 \% 3 \quad 2 \% 3 \quad 8 \% 3 \quad -4 \% 3 \quad 4 \% 3 \quad 10 \% 3 \quad -6 \% 3\]

4) Type the following into Processing and press Play. Explain what you see.

\[
\text{void draw() } \{
\quad \text{background}(0, \text{frameCount} \% 255, 0);
\}\]

5) Fill in the following truth tables for the logical operators given \texttt{boolean} \(x\) and \(y\):

| NOT (!) | OR (||) | AND (&&) |
|---------|---------|----------|
| \(x\)   | \(!x\)  | \(x\) || \(y\) | \(x\) && \(y\) |
| \text{false} | \text{true} | \text{false} | \text{false} | \text{false} | \text{false} | \text{false} | \text{true} | \text{false} | \text{false} | \text{true} | \text{true} |

6) What is the value returned by the following expressions?

\[
\text{true} \quad \text{||} \quad \text{false} \quad \text{true} \quad \text{&&} \quad \text{true} \quad \text{&&} \quad \text{false} \quad !(\text{true} \quad \text{==} \quad \text{false}) \quad (3 \quad \text{>=} \quad 1) \quad \text{&&} \quad (3 \quad \text{<} \quad 10))\]
For the following questions, we will use static Processing code (i.e. no setup() or draw()). Start a new Processing file and add the following code. Make sure that the canvas is blue when you press Play.

```java
int x = 120;
if ( x > 0 ) {
    background(0, 0, 255);
}
```

7) Change the initial value of `x` in your code so that the canvas no longer turns blue. What value of `x` did you use and what color is the canvas now?

`x:` _______  canvas color: ___________

8) Now add another if clause after the first if clause so that the canvas turns red instead of the color you saw in Question 7. Press Play to verify that it works now (changing `x` back to 120 should revert the canvas to blue).

9) Now add another if clause after all your other code that turns the canvas green if `x` is less than or equal to -2. Predict what color the canvas will be for the following values of `x` and then verify in Processing:

<table>
<thead>
<tr>
<th>x</th>
<th>canvas color</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td></td>
</tr>
<tr>
<td>-2</td>
<td></td>
</tr>
<tr>
<td>-1</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>