Conditionals Challenge Sheet (Day 2)

1. Given the following variable declarations:

```
int x = 4;
int y = -3;
int z = 4;
```

What are the results of the following relational expressions? Try to do on your own then test in JGrasp.

a. `x == 4`
b. `x == y`
c. `x == z`
d. `y == z`
e. `x + y > 0`
f. `x - z != 0`
g. `y * y <= z`
h. `y / y == 1`
i. `x * (y + 2) > y - (y + z) * 2`

2. Which of the following if statement headers uses the correct syntax?
   a. `if (x equals 42) {`
   b. `if (x => y) {`
   c. `if [x == 10] {`
   d. `if x = 10 then {`
   e. `if (x == y) {`

3. Challenge: Which of the following expressions is equivalent to `!(a || !b)` (that is has the same value for all possible values of boolean variables `a` and `b`)?

   a. `a || !b`
   b. `!a || b`
   c. `!a && b`
   d. `! a && !b`
   e. `a && !b`

4. Consider the following method.

```
public static void ifElseMystery1(int x, int y) {
   int z = 4;
   if (z <= x) {
       z = x + 1;
   } else {
       z = z + 9;
   }
   if (z <= y) {
       y++;
   }
   System.out.println(z + " " + y);
}
```

   For each call below, write what output is produced.

   a. `ifElseMystery1(3, 20);`
   b. `ifElseMystery1(4, 5);`
   c. `ifElseMystery1(5, 5);`
   d. `ifElseMystery1(6, 10);`

5. Write and test a method that returns the value of the larger of the integers `x` and `y` (or either one, if they are equal) but do not use a `Math` method.

```
public static int max(int x, int y) {
     ...
}
```

6. Write and test a method that returns the value of the larger of the three integers `x`, `y`, and `z`.

```
public static int max(int x, int y, int z) {
     ...
}
```

   Implement in two ways: in the first approach write a one-liner using the `Math.max` method; in the second approach do not use any `Math` methods.

7. Write a method that checks whether a given positive integer `n` is a perfect square. Use `Math`'s `sqrt` and `round` methods to find the square root of `n`, round it, then square the result and compare with `n`.

8. Challenge: Remove as many parentheses as possible without changing the meaning of the condition. If you need help, look up Java Order of Operators and ask us.
   a. `if ((((x + 2) > a) || ((x - 2) < b)) && (y >= 0))`
   b. `if (((a >= b) && (a >= c)) && ((a % 2) == 0))`

9. Write a `boolean` method `isLeapYear(int year)` that returns `true` if `year` is a leap year and `false` otherwise. A leap year is a year that is evenly divisible by 4 and either is not divisible by 100 or is divisible by 400. For example, 2000 and 2004 are leap years, but 2003 and 2100 are not. Write and test in JGrasp.

10. What is the output of the following program?

```
public class Prize {
    public static void main(String args[]) {
        int x = 111;
        switch (x) {
            case 1 :
                System.out.println("-1-");
            case 101 :
                System.out.println("-101-");
            case 111 :
                System.out.println("-111-");
            case 010 :
                System.out.println("-010-");
            default :
                System.out.println("-" + x & y + "-");
        }
    }
}
```

11. Write a console (uses Scanner) Java application that displays the appropriate line of the following poem:

    One, two, buckle my shoe
    Three, four, shut the door
    Five, six, pick up sticks
    Seven, eight, lay them straight
    Nine, ten, that's the end

Problem 11 continues on next page.

Examples:

```
Enter a number 1-10 (or 0 to quit): 1
Buckle your shoe

Enter a number 1-10 (or 0 to quit): 2
Buckle your shoe

Enter a number 1-10 (or 0 to quit): 6
Pick up some sticks

Enter a number 1-10 (or 0 to quit): 0
Bye
```

Use a `switch` statement.

Conditionals Answer Sheet (Day 2)

1. (Practice-It)
    a. true
    b. false
    c. true
    d. false
    e. true
    f. false
    g. false
    h. true
    i. true
2. E (Practice-It)
3. C (Java Methods Book)
4. (Practice-It)
    a. 13 21
    b. 5 6
    c. 6 5
    d. 7 11
5. Test in JGrasp. (Java Methods Book)
6. Test in JGrasp (Java Methods Book)
7. Test in JGrasp (Java Methods Book)
8. (Java Methods Book)
    a. `if (x && y || !a && !b)`
    b. `if ((a >= b && a >= c) && a % 2 == 0)`
9. Test in JGrasp (Java Methods Book).
10. -111- (MeritCampus)
11. Test in JGrasp (Java Methods Book)