Loops Challenge Sheet (Day 3)

1. For each of the following while loops, how many times will the loop execute its body? Remember that "zero," "infinity," and "unknown" are legal answers.

   a.

```
int x = 1;
while (x < 100) {
    System.out.print(x + " ");
    x += 10;
}
```

   b.

```
int max = 10;
while (max < 10) {
    System.out.println("count down: " + max);
    max--;
}
```

   c.

```
int x = 250;
while (x % 3 != 0) {
    System.out.println(x);
}
```

   d.

```
int x = 2;
while (x < 200) {
    System.out.print(x + " ");
     x *= x;
}
```

   e.

```
String word = "a";
while (word.length() < 10) {
    word = "b" + word + "b";
}
```

   f.

```
int x = 100;
while (x > 0) {
    System.out.println(x / 10);
    x = x / 2;
}
```

2. Given the following method:

```
public static void mystery(int x) {
    int y = 1;
    int z = 0;
    while (2 * y <= x) {
        y = y * 2;
        z++;
    }
    System.out.println(y + " " + z);
}
```

Write the output of each of the following calls:

a. `mystery(1);`
b. `mystery(6);`
c. `mystery(19);`
d. `mystery(39);`
e. `mystery(74);`

3. Use loops to:
    a. Sum up to a given variable (add all the whole numbers before the number and it)
        i. 4 would be 10 (1 + 2 + 3 + 4)
        ii. 5 would be 15 (1 + 2 + 3 + 4 + 5)
    b. Find the factorial of a given variable
    c. Print even numbers from zero to twenty
    d. Print from `x` to `y`
    e. Print from `x` to `y` skipping multiples of 3.

4. Challenge: Write a `do/while` loop that repeatedly prints a certain message ("She sells seashells by the seashore") until the user tells the program to stop. The `do/while` is appropriate because the message should always be printed at least one time, even if the user types n after the first message appears.

5. Challenge: Write a method called `zeroDigits` that accepts an integer parameter and returns the number of digits in the number that have the value `0`. For example, the call `zeroDigits(5024036)` should return `2`, and `zeroDigits(743)` should return `0`. The call `zeroDigits(0)` should return 1. You may assume that the integer is non-negative. (We suggest you use a do/while loop in your solution.)

6. Write a method `intaddOdds(int n)` that calculates and returns the sum of all odd integers from 1 to n. Your method should use exactly one `for` loop and no other iterative or `if-else` statements (Do not use the formula for the sum of odd numbers).

7. Write a method `sumDigits` that calculates and returns the sum of all the digits of a given non-negative integer.

8. Challenge: Each time Kevin rereads his Java book (which happens every month), he learns 10% of whatever material he didn't know before. He needs to score at least 95% on the comprehensive exam to become a certified Java developer. When Kevin started, he knew nothing about Java. Write a method that simulates Kevi's learning progress and returns the number of months it will take him to get ready for the exam. Write a `main` method that displays the results (in years and months).

Loops Answer Sheet (Day 3)

1. (Practice-It)
    a. `10`
    b. `0`
    c. `infinity`
    d. `3`
    e. `5`
    f. `7`
2. (Practice-It)
    a. `1 0`
    b. `4 2`
    c. `16 4`
    d. `32 5`
    e. `64 6`
3. Test in JGrasp.
4. Test in JGrasp. (Java Methods Book)
5. Test in JGrasp. (Java Methods Book)
6. Test in JGrasp. (Java Methods Book)
7. Test in JGrasp. (Java Methods Book)
8. Test in JGrasp. (Java Methods Book)