Loop (iteration) structures: part 1

Loop logic

- initialization of control variable
- control test
- control update

Count control vs. Event control

Loop syntax:

- **while loop**

```java
// example 1
int x = 0; // control variable initialization
while (x < 100) // control variable test
{
    System.out.printf("x=%d\n", x);
    x ++; // control variable updated
}

// example 2
public class countDown {
    public static void main(String [] args) {
        int x = 10;
        while (x > 0)
        {
            System.out.printf("%d\n", x);
            x--;
        }
    System.out.println("Lift off!");
    }
}

// example 3
Scanner kb = new Scanner(System.in) ;
int thisNum;
int total = 0; // initialize sum
int count = 0; // initialize loop control
while ( count < 100 ) // test expression
{
    System.out.print ("Enter value: ");
    thisNum = kb.nextInt(); // read 1 value
    total = total + thisNum ; // add value to sum
    count++ ; // update loop control
}
System.out.println ("The sum of the values is: " + total);
System.out.println ("The average is: " +
                   (double)total/count);
```
// example 4
Scanner kb = new Scanner(System.in);
String reply = "y";
int thisNum, total = 0;
System.out.print("Enter a positive number: ");
thisNum = kb.nextInt();
while (reply.equals("y") || reply.equals("Y")) {
    total = total + thisNum;
    System.out.print("Enter y to continue, n to stop: ");
    reply = kb.next();
    if (!reply.equals("n") && !reply.equals("N")){
        System.out.print("Enter a positive number: ");
        thisNum = kb.nextInt();
    }
}
System.out.println("Total of values entered is: "+total);

// example 5
Scanner kb = new Scanner(System.in);
int age;
System.out.print("Enter your age (between 0 and 130): ");
age = kb.nextInt();
while (age < 0 || age > 130) {
    System.out.println("An invalid age was entered. Please try again.");
    System.out.print("Enter your age (between 0 and 130): ");
age = kb.nextInt();
}

// example 6
Scanner kb = new Scanner(System.in);
int num, // random number
    factor, // factor to find multiples of
    howMany, // number of random values to generate
    lcount = 0, // loop counter
    ocount = 0; // occurrence counter
Random rg = new Random();
System.out.print("How many tries?: ");
howMany = kb.nextInt();
System.out.print("Enter numeric factor to look for: ");
factor = kb.nextInt();
while (lcount < howMany) {
    num = Math.abs(rg.nextInt());
    if (num % factor == 0)
        ocount++;
    lcount++;
}
System.out.println("There were "+ocount+" multiples of "+factor+" in this set of "+howMany+" random numbers.");