6.1 The while Statement

1. Write a while statement to add numbers 11 through 20. Is this a count-controlled or sentinel-controlled loop?

   Answer:

   ```java
   int sum = 0, i = 11;
   while ( i <= 20 ) { //this is a count-controlled
       sum += i;
       i++;
   }
   ```

2. Write a while statement to read in real numbers and stop when a negative number is entered. Is this a count-controlled or sentinel-controlled loop?

   ```java
   Scanner scanner = new Scanner(System.in);
   double num;

   System.out.print("Enter number:");
   num = scanner.nextDouble();
   ```
while ( num >= 0 ) { //this is a
    //sentinel-controlled
    //do some operation using num
    System.out.print("Enter number:");
    num = scanner.nextDouble();
}

6.2 Pitfalls in Writing Repetition Statements

1. Which of the following is an infinite loop?

   a. int sum = 0, i = 0;
      while ( i >= 0 ) {
         sum += i;
         i++;
      }

   b. int sum = 0, i = 100;
      while ( i != 0 ) {
         sum += i;
         i--;
      }

2. For each of the following loop statements, determine the value of sum after the loop is executed.

   a. int count = 0, sum = 0;
      while ( count < 10 ) {
         sum += count;
         count++;
      }

   b. int count = 1, sum = 0;
      while ( count <= 30 ) {
         sum += count;
         count += 3;
      }

   c. int count = 0, sum = 0;
      while ( count < 20 ) {
         sum += 3*count;
         count += 2;
      }
6.3 The do–while Statement

1. Write a do–while loop to compute the sum of the first 30 positive odd integers.

   int num, sum = 0, i = 1; /* A */
   do {
       num = 2*i - 1; //get the i’th odd number
       sum += num;
       i++;
   } while ( i <= 30);

---------------------------------------------------

   int num = 1, sum = 0, i = 1; /* B */
   do {
       sum += num;
       num += 2; //get the next odd number
       i++;
   } while ( i <= 30);

2. Rewrite the following while loops as do–while loops.

   a. int count = 0, sum = 0;
      while ( count < 10 ) {
         sum += count;
         count++;
      }

   Answer:

      int count = 0, sum = 0;
      do {
         sum += count;
         count++;
      } while ( count < 10);
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b.  
```
int count = 1, sum = 0;
while ( count <= 30 ) {
  sum += count;
  count += 3;
}
```

**Answer:**
```
int count = 1, sum = 0;
do {
  sum += count;
  count += 3;
} while ( count <= 30);
```

---

### 6.4 Loop-and-a-Half Repetition Control

1. Translate the following while loop to a loop-and-a-half format.
```
int sum = 0, num = 1;
while (num <= 50) {
  sum += num;
  num++;
}
```

**Answer:**
```
int sum = 0, num = 1;
while (true) {
  if (num > 50) break;
  sum += num;
  num++;
}
```

2. Translate the following do-while loop to a loop-and-a-half format.
```
int sum = 0, num = 1;
do {
  sum += num;
  num++;
} while (sum <= 5000);
```
Answer:

```java
int sum = 0, num = 1;
while (true) {
    sum += num;
    num++;
    if (sum > 5000) break;
}
```

6.5 The for Statement

1. Write a for loop to compute
   a. the sum of 1, 2, ..., 100.
   b. the sum of 2, 4, ..., 500.
   c. the product of 5, 10, ..., 50.

   a. sum = 0;
      for (int i = 1; i <= 100; i++) {
          sum += i;
      }
   
   b. sum = 0;
      for (int i = 2; i <= 500; i+=2) {
          sum += i;
      }
   
   c. sum = 0;
      for (int i = 5; i <= 50; i+=5) {
          sum += i;
      }

2. Rewrite the following while loops as for statements.

   a. int count = 0, sum = 0;
      while ( count < 10 ) {
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```java
sum += count;
count++;
}

Answer:

sum = 0;
for (int count = 0; count < 10; count++) {
    sum += count;
}

b. int count = 1, sum = 0;
while (count <= 30) {
    sum += count;
    count += 3;
}

Answer:

sum = 0;
for (int count = 1; count <= 30; count+=3) {
    sum += count;
}

6.6 Nested-for Statements

1. What will be the value of sum after the following nested-for loops are executed?

   a. int sum = 0;
      for (int i = 0; i < 5; i++) {
          sum = sum + i;
          for (int j = 0; j < 5; j++) {
              sum = sum + j;
          }
      }

   b. int sum = 0;
      for (int i = 0; i < 5; i++) {
          sum = sum + i;
          for (int j = i; j < 5; j++) {
              sum = sum + j;
          }
      }

   60  50
2. What is wrong with the following nested-for loop?

```java
int sum = 0;
for (int i = 0; i < 5; i++) {
    sum = sum + i;
    for (int i = 5; i > 0; i--) {
        sum = sum + j;
    }
}
```

*The same variable i is used in both loops. The variable j is not declared nor assigned an initial value.*

6.7 Formatting Output

1. Determine the output of the following code:

```java
System.out.format("%3d + %3d = %3d", 1, 2, 3);
System.out.format("%tY", new Date());
System.out.format("%2$s,%1$s", "John", "Smith");
```

*Answer:*

```
1 +   2 =   3
2004Smith,John
```

*Notice that the format method does not automatically moves to the next line. You need to add \n at the end of the control string to do so.*

2. What’s wrong with the following code?

```java
Formatter f = new Formatter();
f.format("%8.3f", 232.563);
```

*The format method of the Formatter class returns a formatted string. It does not send the result to output. To send the result to the standard output, for example, we write*

```java
System.out.println(f.format("%8.3f", 232.563));
```
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```
or
System.out.format("%8.3f", 232.563);
```

6.8 Loan Tables

No Quick Check Questions.

6.9 Estimating the Execution Time

No Quick Check Questions.

6.10 (Optional) Recursive Methods

No Quick Check Questions.

6.11 Sample Program: Hi-Lo Game

No Quick Check Questions.