

# 1 Loops

**Solution:**

1. (a) What is the value of **result** when the following code is executed?

```
1      int result = 0;
2      int a = 5;
3      int b = 3;
4      for(int i = 1; i <= a; i++) {
5          result+=b;
6      }
```

**Solution:** 15

- (b) What is the value stored in **result** in terms of **a**, **b**?

**Solution:**  $a * b$

2. (a) What is the value of **result** when the following code is executed?

```
1      int result = 0;
2      int a = 5;
3      int b = 3;
4      for(int i = 1; i < a; i++) {
5          result+=b;
6      }
```

**Solution:** 12

- (b) What is the value stored in **result** in terms of **a**, **b**?

**Solution:**  $(a-1) * b$

3. (a) What is the value of **result** when the following code is executed?

```
1      int result = 1;
2      int x = 5;
3      int n = 3;
4      for(int i = 1; i <= n; i++) {
5          result*=x;
6      }
```

**Solution:** 125

- (b) What is the value stored in **result** in terms of **x**, **n**?

**Solution:**  $x^n$

4. What is the value of **result** when the following code is executed?

```
1 int result = 0;
2 for(int i = 1; i <= 10; i++) {
3     if(i != 4) {
4         result++;
5     }
6     else {
7         result+=2;
8     }
9 }
```

**Solution:** 11

5. (a) What is the value of **result** when the following code is executed?

```
1 int result = 0;
2 int a = 4;
3 int b = 3;
4 for(int i = 1; i <= a; i++) {
5     for(int k=1; k <= b; k++) {
6         result++;
7     }
8 }
```

**Solution:** 12

- (b) What is the value stored in **result** in terms of **a**, **b**?

**Solution:**  $a * b$

- (c) Based on your answer to part (b), what is the value of **result** when the following code is executed?

```
1 int result = 0;
2 int a = 10;
3 int b = 10;
4 for(int i = 1; i <= a; i++) {
```

```

5         for(int k=1; k <= b; k++) {
6             result++;
7         }
8     }

```

**Solution:** 100

6. (a) What is the value of **result** when the following code is executed?

```

1  int result = 0;
2  int a = 10;
3  int b = 10;
4  for(int i = 1; i <= a; i++) {
5      for(int k=i; k <= b; k++) {
6          result++;
7      }
8  }

```

**Solution:** 55

- (b) (**challenging**) What is the value stored in **result** in terms of **a**, **b**?

**Solution:**  $b + (b - 1) + \dots + (b - a + 1)$

7. Write a piece of code that outputs the following in the console, using a **loop**. Use **print()** statement.

2 5 8 11 14 17 20 23 26 29 32 35 38 41 44 47 50

**Solution:**

```

1  for(int i=2; i <= 50; i+=3)
2      print(i+" ");

```

8. Write a piece of code that outputs the following in the console, using a **loop**. Use **print()** statement.

100 95 90 85 80 75 70 65 60 55 50 45 40 35 30 25 20

**Solution:**

```

1  for(int i=100; i >= 20; i-=5)
2      print(i+" ");

```

9. Write a piece of code that outputs the following in the console, using a **loop**. Use `print()` statement.

1 2 4 8 16 32 64 128 256 512 1024 2048 4096 8192

**Solution:**

```
1 for(int i=1; i <= 8192; i*=2)
2     print(i+" ");
```

10. Write a piece of code that outputs the following in the console, using a **loop**. Use `print()` statement. **IMPORTANT:** Pay attention to the pattern, this is a tricky one.

7 14 21 28 35 42 49 56 63 77 84 91 98 105 112 119 126 133 147

**Solution:**

```
1 for(int i=7; i <= 147; i+=7) {
2     if(i%10 != 0) {
3         print(i+" ");
4     }
5 }
```

11. Assuming an integer variable `n` such that  $1 \leq n \leq 10$ , write a piece of code that stores into an integer variable `fact` the product of the first `n` positive integers, that is,  $1 * 2 * \dots n$ .

**Solution:**

```
1 int fact = 1;
2 for(int i=1; i <= n; i++) {
3     fact*=i;
4 }
```

12. Assuming an integer variable  $n \geq 1$ , write a piece of code that stores into a **boolean** variable `isPrime`,

- `true` if `n` is a prime number.
- `false` if `n` is not a prime number.

An integer is called a *prime* if it more than 1 and is divisible only by 1 and itself.

**Solution:**

```
1  boolean isPrime = true; //assume it's a prime
2  for(int i=2; i*i <= n; i++) {
3      if(n%i == 0) {
4          isPrime = false;
5      }
6  }
```