

## 1 Our First Java Program

Below is our first Java program of the semester. Next to each line, write out what you think the code will do when run. *This exercise is adapted from Head First Java.*

```
1  int size = 27;
2  String name = "Fido";
3  Dog myDog = new Dog(name, size);
4  int x = size - 5;
5  if (x < 15) {
6      myDog.bark(8);
7  }
8  while (x > 3) {
9      x -= 1;
10     myDog.play();
11 }
12 int[] numList = {2, 4, 6, 8};
13 System.out.print("Hello ");
14 System.out.println("Dog: " + name);
15 System.out.println(numList[1]);
16 if (numList[3] == 8) {
17     System.out.println("potato");
18 }
```

For your convenience, here is the same code in Python:

```
1  size = 27
2  name = "Fido"
3  myDog = Dog(name, size)
4  x = size - 5;
5  if x < 15:
6      myDog.bark(8)
7  while x > 3:
8      x -= 1
9      myDog.play()
10 numList = [2, 4, 6, 8]
11 print("Hello")
12 print("Dog: " + name)
13 print(numList[1])
14 if numList[3] == 8:
15     print("potato")
```

## 2 Mystery

This is a function (a.k.a. method). It takes an array of integers and an integer as arguments, and returns an integer.

```
1 public static int mystery(int[] inputArray, int k) {
2     int x = inputArray[k];
3     int answer = k;
4     int index = k + 1;
5     while (index < inputArray.length) {
6         if (inputArray[index] < x) {
7             x = inputArray[index];
8             answer = index;
9         }
10        index = index + 1;
11    }
12    return answer;
13 }
```

- (a) What `mystery` returns if `inputArray = [3, 0, 4, 6, 3]` and `k = 2`.  
(b) Can you explain in English what does `mystery` do?

*Extra:* This is another function. It takes an array of integers and returns nothing.

```
1 public static void mystery2(int[] inputArray) {
2     int index = 0;
3     while (index < inputArray.length) {
4         int targetIndex = mystery(inputArray, index);
5         int temp = inputArray[targetIndex];
6         inputArray[targetIndex] = inputArray[index];
7         inputArray[index] = temp;
8         index = index + 1;
9     }
10 }
```

Describe what `mystery2` does if `inputArray = [3, 0, 4, 6, 3]`.

### 3 Writing Your First Program

Implement `fib` which takes in an integer `n` and returns the  $n$ th Fibonacci number. You may not need to use all the lines.

The Fibonacci sequence is 0, 1, 1, 2, 3, 5, 8, 13, 21, ...

```
public static int fib(int n) {
```

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```
}
```

*Extra:* Implement `fib` in 5 lines or fewer. Your answer must be efficient. You don't have to make use of the parameter `k` in your solution.

```
public static int fib2(int n, int k, int f0, int f1) {
```

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```
}
```