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CS 61B Spring 2021

Introduction to Java

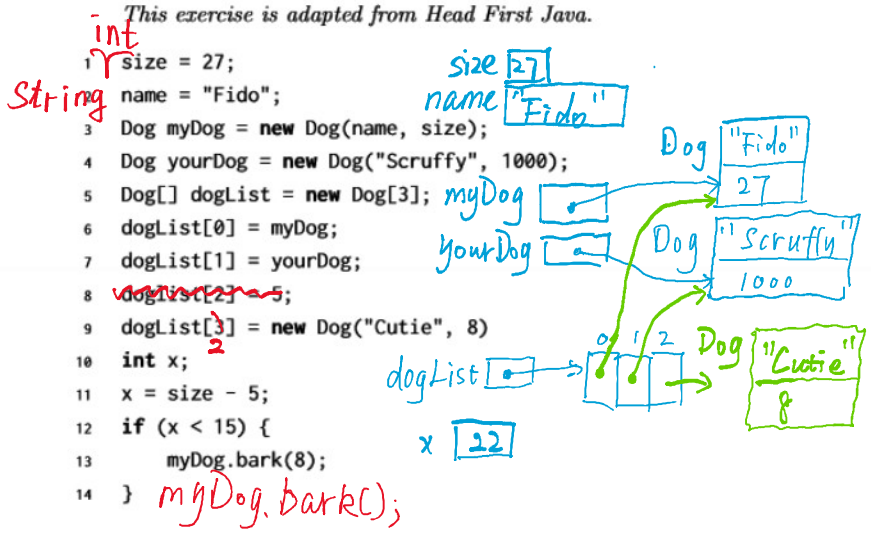
Discussion 2: January 25th, 2021

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. If you think the line will result in an error, correct it, and proceed through the code as if it is running your corrected version.

This exercise is adapted from Head First Java.

```
1  size = 27;
2  name = "Fido";
3  Dog myDog = new Dog(name, size);
4  Dog yourDog = new Dog("Scruffy", 1000);
5  Dog[] dogList = new Dog[3];
6  dogList[0] = myDog;
7  dogList[1] = yourDog;
8  dogList[2] = 5;
9  dogList[3] = new Dog("Cutie", 8)
10 int x;
11 x = size - 5;
12 if (x < 15) {
13     myDog.bark(8);
14 }
```



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 }
```

returns 4.

(a) Describe what `mystery` returns if `inputArray = [3, 0, 4, 6, 3]` and `k = 2`.

(b) Can you explain in plain English what `mystery` does?

It will return the index of the minimal element in elements after index k (included)

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 }
```

swap } iterate index

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

Find the min ele between index 0 ~ 4
swap index 0 ele with min ele
Find the min ele between index 1 ~ 4
swap index 1 ele with min ele.
...

It sorts the array. [3, 0, 4, 6, 3]
↓
[0, 3, 3, 4, 6]

3 Writing Your First Program

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

The Fibonacci sequence is $0, 1, 1, 2, 3, 5, 8, 13, 21, \ldots$. The first two numbers in the sequence are 0 and 1, and every number thereafter it is the sum of the two numbers in the sequence before it.

```
public static int fib(int n) {
    if(n<2) return n;
    else return fib(n-1)+fib(n-2);
}
```

Extra: Implement a more efficient version of `fib` in 5 lines or fewer. Here, efficiency might mean making less recursive calls or doing less overall computation. 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) {
    if(n==0) return f0;
    else retuve fib2(n-1,k,f1,f0+f1);
}
```

But we need to call with fib2(n, k, 0, 1)