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15-121 Fall 2021 Quiz 3

Up to 20 minutes. Show your work. No calculators, no notes, no books, no computers, no other people.

1. (2 points) **Short Answer:** In just a few words, what's the difference between a class and an object?

2. (4 points) **Code Tracing**

Indicate what the following program prints. Place your answer (and nothing else) in the box under the code.

```
public class Quiz3CT {
    private int hey;

    public Quiz3CT(int hey, int b) {
        this.hey = 2;
        for (int i = hey; i < b; i++) {
            this.hey += i / 2;
        }
        System.out.println("C:" + this.hey);
    }

    public int tweak(int hey) {
        System.out.println("D:" + hey);
        this.hey += hey;
        return hey + 5;
    }

    public String toString() {
        return "Hey: " + this.hey;
    }

    public static void main(String[] args) {
        Quiz3CT ct1 = new Quiz3CT(5, 10);
        Quiz3CT ct2 = new Quiz3CT(3, 7);
        System.out.println(ct1);
        System.out.println(ct2);
        ct2.tweak(ct1.tweak(2));
        System.out.println(ct1);
        System.out.println(ct2);
    }
}
```

3. Free Response

Consider the following skeleton code:

```
public class StringList {
    private String[] stringArray;
    private int numItems;

    public StringList() {
        this.stringArray = new String[10];
        this.numItems = 0;
    }

    public boolean append(String item) {
        if (this.numItems < this.stringArray.length) {
            this.stringArray[this.numItems++] = item;
            return true;
        }
        return false;
    }

    /**
     * Checks if a given item is in the StringList. Uses startAt to decide where to
     * start searching. For example, contains("Puppy",0) searches the entire list
     * for the string Puppy. contains("Puppy",5) only searches at indices >= 5.
     *
     * This is a helper function for hasDuples.
     *
     * @param item    The item to search for
     * @param startAt The index to start searching at
     * @return true if the item is in the list at or after startAt, and false
     *         otherwise.
     */
    private boolean contains(String item, int startAt) {
        // You will write this code
    }

    /**
     * Determine if the StringList contains any duplicate items.
     *
     * @return true if there are any duplicates and false otherwise.
     */
    public boolean hasDuples() {
        // You will write this code
    }
}
```

The question continues on the next page.

(a) (7 points) Write the `contains` method specified above.

(b) (7 points) Write the `hasDups` method specified above.