

CIS1068 Practice Problems: Object & methods

1. Tracing programs

a. What gets printed to the screen when we execute the MysteryClient class on the left?

<pre>public class MysteryClient { public static void main(String [] args) { Mystery m = new Mystery("hello"); m.display(" again"); } }</pre>	<pre>public class Mystery { public String str = null; public Mystery(String s) { str = s; } public void display(String s) { System.out.println(str + s); } }</pre>
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b. What gets printed to the screen when we execute the MysteryClient class on the left?

<pre>public class MysteryClient { public static void main(String [] args) { Mystery m = new Mystery(15, 27); m.display(3); Mystery m2 = new Mystery(16, 28); m2.reduce(4); m2.display(4); } }</pre>	<pre>public class Mystery { public int x = 0; public int y = 0; public Mystery(int num1, int num2) { x = num1; y = num2; } public void display(int z) { if(x%z == 0 && y%z == 0) { System.out.println("divides"); } else { System.out.println("too bad"); } } public void reduce(int z) { x = x / z; y = y / z; } }</pre>
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c. What are the values of the variables in main() at POINT 1?

<pre>public class MysteryClient { public static void main(String [] args) { Mystery m = new Mystery("hello"); // POINT 1 } }</pre>	<pre>public class Mystery { public String str = null; public Mystery(String s) { str = s; } }</pre>
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d. What are the values of the variables in main() at POINT 1? and at POINT 2? and 3?

<pre>public class MysteryClient { public static void main(String [] args) { Mystery m1 = new Mystery(); Mystery m2 = new Mystery(); // POINT 1 m1.setArr(3, 7); m2.setArr(2, 9); // POINT 2 int x = m1.getVal(2); int y = m1.getVal(2); int z = m2.getVal(0); // POINT 3 } }</pre>	<pre>public class Mystery { public int [] arr = null; public void setArr(int len, int val) { arr = new int[len]; for(int i=0; i<len; i++) { arr[i] = val; } } public int getVal(int pos) { arr[pos]++; return arr[pos]; } }</pre>
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2. Object & instance methods

- a. Write a class Account with a constructor that accepts a series of charge accounts as its argument. These numbers should be stored in an array *records* that is initiated in the class as a **private** attribute. Then, write an accessor that accepts an account number as its argument. If this test account number is in the array *records*, true should be returned, otherwise, false.

Your Account class should support the given class AccountApplication as shown in the below. The execution of both Account.java and AccountApplication.java should display a message indicating whether the number is valid or invalid.

```

1 package account;
2 import java.util.Scanner;
3
4 public class AccountApplication {
5
6     public static void main(String[] args) {
7
8         int[] data = {5658845,4250125,7895122,8777541,
9                       8451277,1302850,8080152,4562555,
10                      5552012,5050552,7825877,1250255,
11                      1005231,6545231,3852085,7576651,
12                      7881200,4581002};
13
14         Account a = new Account(data);
15
16         Scanner kb = new Scanner (System.in);
17         System.out.println("Input your account number:");
18
19         int acc = kb.nextInt();
20         System.out.println("The account is valid? "
21                             +a.valid(acc));
22     }
23 }
24

```

- b. Write a class `DirverExam` with a constructor that accepts an array of `char` as the correct answers of the local driver's license exam. The records must be saved in a private attribute *key*. The class contains a method *testing* to allow this student to input all answers (by `nextLine().toUpperCase().charAt(0)`) to match the *key*. The class must have another **private** array *answers* to save that student's answers. When the student cannot ensure the answer, he/she can key in <enter> directly. See the demo of this testing in the below. This `DriverExam` class also should have the following methods (public):
- `Passed ()`, returns true if the student passed the exam, or false if the student failed. The exam has 20 multiple questions. A student must correctly answer 15 of the 20 questions to pass the exam.
 - `totalCorrect ()`, returns the total number of correctly answered questions.
 - `totalIncorrect ()`, returns the total number of incorrectly answered questions.
 - `questionsMissed ()`, returns an array of integers that contains the numbers of the questions that the student missed or answered incorrectly. Note that in the student score array, any character other than 'A', 'B', 'C', or 'D' will also be treated as an answer missed.

This class should support another class `DL` with the only static main method. That main method can test all the above methods.

```

1 package dl;
2
3 import java.util.Arrays;
4
5 public class DL {
6     public static void main(String[] args) {
7         char[] key =    {'B', 'D', 'A', 'A', 'C',
8                         'A', 'B', 'A', 'C', 'D',
9                         'B', 'C', 'D', 'A', 'D',
10                        'C', 'C', 'B', 'D', 'A'};
11
12         DriversExam d = new DriversExam(key);
13
14         d.testing();
15
16         System.out.println("Passed the test? "+d.passed());
17         System.out.println("Answers correct: "+d.totalCorrect());
18         System.out.println("Answers incorrect: "+d.totalIncorrect());
19         System.out.println("Answers missed: "
+Arrays.toString(d.questionsMissed()));
20     }
21 }
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- c. Write a class GradeBook with a constructor that accepts five students' names, grades, and 4 test scores and save in the **private** fields:
- names, a string array to hold five students' names
 - grades, an array of 5 characters to hold the five students' letter grades.
 - testScores, a 2-dimentional array to hold 4 test scores for each of five students.

The class should have a constructor for the user to enter each student's name and his or her four test scores. The constructor will use an associate method (private double getAvg(int index)) to obtain the average test score, and then convert to a letter grade. This method will use the following **Numeric-To-Letter-Grade Scale**: 90-100 A, 80-89 B, 70-79 C, 60-69 D, 0-59 F. The accessor (public String toString) will return a string that carries all names, their average scores, and letter grades.

This class should support another class Grade with the only static main method. That main method can test all the above accessors. Note that any score less than 0 or greater 100 is not acceptable.

```
1 package grade;
2 public class Grade {
3     public static void main(String[] args) {
4         GradeBook g = new GradeBook(5);
5         System.out.println(" " + g);
6     }
7 }
8
```