17.5/20

HW Procedural Programming

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Describe help received: N/A

1 [10pts] Consider the following program:

HWEX1.java

```
import java.util.*;

public class HWEX1 {
  public static Rat read() {
    Scanner sc = new Scanner(System.in);
    String nm = sc.next();
    double wt = sc.nextDouble();
    double wtInGrams = wt*28.3495;
    Rat r = new Rat();
    r.name = nm;
    r.weight = wtInGrams;
    return r;
  }

  public static void main(String[] args) {
    Rat subj1 = read();
  }
}
```

Rat.java

```
class Rat {
  String name;
  double weight;
}
```

Identify each of the following as either primitive, an array-reference or a class-reference:

`args`	array-reference
`subj1`	class-reference
`sc`	class-reference
`nm`	class-reference
`wt`	primitive
`wtInGrams`	primitive
`r`	class-reference
`r.name`	class-reference
`r.weight`	primitive

-1/2

2. [5pts] Continuing from the previous example, how many instances of class `Rat` are created when this program is run? How many instances of class `String` are created when the function `read()` is called, assuming the user inputs name & weight properly. Explain your answers! [Note: "instance" is a technical term. Read the notes!]

There is only one instance of class Rat created, r, because that is the only line that defines a new Rat object.
There is only 2 instance of the String class as well because nm is the only new String object in the read() function.

3. [5pts] Consider the following file HWEX2.java:

```
public class HWEX2 {
  public static int fact(int n) {
    return n < 2 ? 1 : n*fact(n-1);
  }
  public static void main(String[] args) {
    for(int i = 1; i < 10; i++)
      System.out.println(i + ": " + fact(i));
  }
}
```

How would you call the function fact to compute 15 factorial from the main function of another .java file (assume it is HW.java)? If you run the program from HW.java (i.e. give the command `java HW`), how does the JVM know where to find the code for the fact function?

You can call a function from another class using the full name. For this example, calling HWEX2.fact(15) would work. The JVM knows it needs to load the HWEX2.class file because that is where HWEX2 is defined.

4. [80Pts] Create a file entitled Mid.java and put this class definition in it:

```
public class Mid {
  public String alpha;
  public String firstName;
  public String lastName;
  public int company;
}
```

Then write a program entitled HW3.java with the following attributes:

- A createMid() method that takes a single Scanner object as a parameter. It must ask the user and use the Scanner for the information necessary to construct a Mid. It then returns that Mid.
- A printMid() method that takes a Mid as an argument and prints the information about that Mid to the screen.
- When you print the alpha code, any leading zeros should print properly. For example: '012226'
- A main() method that asks how many Mids you would like to enter, then creates an array of that many Mids. It uses your createMid() function to fill that array up with constructed Mids. It then asks the user for a company number, and uses your printMid() function to print the information about all mids in that company to the screen.
- You should have two files, 'Mid.java' and 'HW3.java'
- **Compiling!**: with two files, just run *javac Mid.java HW3.java* or the broader *javac *.java*

An example run:

```
~/$ java HW3
How many mids? 3
Alpha? 160006
First name? George
Last name? Finklehoffer
Company? 3
Alpha? 160012
First name? John
Last name? Jingleheimer-Smith
Company? 4
Alpha? 160018
First name? Sterling
Last name? Hotchkiss
Company? 3
What company would you like to print out? 3
160006 Finklehoffer George 3
160018 Hotchkiss Sterling 3
```

Your input and output should be exactly as it is above.

Turn In Your answers to questions 1,2, and 3 in class. Submit the code for question 4 via the Submit system. An example of the command to submit your code:

```
/bin/submit -c=IS211 -p=hw3 HW3.java Mid.java
```