CS1400 Review Questions

Introduction to Classes

Question 1 Which of the following is correct?
a) A single object can be created from a class
b) A single class can be created from an object
c) Multiple objects can be created from a class
d) Multiple classes can be created from an object
Answer: c

Question 2 Use the following class to answer the questions below:

```
public class Store  {
        private int quantity;
        private double price;

        public Store(int q, double p) {
                quantity = q;
                price = p;
        }

        public int getQuantity() {
                return quantity;
        }

        public void setPrice(double p) {
                price = p;
        }

        public double calcTotal () {
                return price * quantity;
        }
}
```

a) What is the name of the class? Store
b) List all instance variables of the class. quantity, price
c) List all methods of the class. Store(int, double), getQuantity(), setPrice(double), calcTotal()
d) List all mutators in the class. setPrice(double)
e) List all accessors in the class. getQuantity()
f) List which method is the constructor. Store(int, double)
g) Write a mutator for the quantity.
Answer:

```
public void setQuantity(int q) {
        quantity = q;
}
```

h) Write an accessor for the price.
Answer:

```
public double getPrice() {
        return price;
}
```

i) Write a line of code that will create an instance called videoStore that has quantity 100 and a price of 5.99.

Answer:

```
Store videoStore = new Store(100, 5.99);
```

j) Call the calcTotal method with the videoStore object (from part i) to print out the total.

Answer:

```
System.out.println("Total: " + videoStore.calcTotal());
```

Question 3 True or False? If no constructor is provided, then Java automatically provides a default constructor. Answer: True. Java will automatically provide a default constructor if none is given. However, if any other constructor is given, the default constructor can no longer be used.

Question 4 True or False? A method must have at least 1 return statement. Answer: False. Any method with return type void is not required to have a return statement.

Question 5 Correct the following class definition if you think it will not work:

```
public class Student  {
        private String name , major;

        public Student () {
                name = "???";
                major = "xxx";
        }

        public Student(String n, String m) {
                n = name ;
                m = major ;
        }

        public String getMajor() {
                return m;
        }

        public String getName() {
                return n;
        }
}
```

Answer: There are problems in the assignment in the constructor, "n = name" and "m = major" should be the other way around. Also, the "return m" in getMajor and "return n" in getName need to be "return major" and "return name", respectively.

Question 6 Implement a class called CppStudent. The class should keep track of the student's name, number of classes registered, hours spent per week for a class (consider a student devotes the same amount of time for each of his/her classes per week). Implement a toString method to show the name and number of classes registered by a student, a getName method to return the name of the student, a getTotalHours method to return the total number of hours per week, and a setHours method to set the number of hours the student devotes for each class.

Answer:

```
public class CppStudent {
        private String sName;
        private int classNum, hrPerWeek;

        public CppStudent(String name, int class, int hr) {
                sName = name;
                classNum = class;
                hrPerWeek = hr;
        }

        public String toString() {
                return sName + " " + classNum;
        }

        public String getName() {
                return sName;
        }

        public int getTotalHours() {
                return classNum * hrPerWeek;
        }

        public void setHours(int time) {
                hrPerWeek = time;
        }
}
```

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Methods

Question 1 Write a boolean method called allDifferent that takes 3 int numbers and returns true if the numbers are all different and false otherwise.

Answer:

```
public boolean allDifferent(int num1, int num2, int num3) {
        if (num1 != num2 && num1 != num3 && num2 != num3) {
                return true;
        } else {
                return false;
        }
}
```

Or equivalently,

```
public boolean allDifferent(int num1, int num2, int num3) {
        return num1 != num2 && num1 != num3 && num2 != num3;
}
```

Question 2 Write a boolean method called isPrime that takes in an int number, and returns true if the number is prime, and false otherwise.

Answer:

```
public boolean isPrime(int n) {
        // Question: how can we improve the performance of this loop?
        // (Hint: what is the max number relative to n that can divide into n?)
        for (int i = 2; i < n; i++) {
                if ( n % i == 0){
                        return false;
                }
        }
        return true;
}
```

Question 3 Write the output generated by the following program:

```
public class Two {
        private double real, imag;

        public Two(double initReal, double initImag) {
                real = initReal;
                imag = initImag;
        }
```

```
        public double getReal() {
                return real;
        }

        public double getImag() {
                return imag;
        }

        public Two mystery(Two rhs) {
                Two temp = new Two(getReal() + rhs.getReal(),
                        getImag() + rhs.getImag());
                return temp;
        }
}

public class Test {
        public static void main(String[] args) {
                Two a = new Two(1.2, 3.4);
                Two b = a.mystery(a);
                Two c = b.mystery(b);

                System.out.println("1. " + a.getReal());
                System.out.println("2. " + a.getImag());
                System.out.println("3. " + b.getReal());
                System.out.println("4. " + b.getImag());
                System.out.println("5. " + c.getImag());
        }
}
```

Answers:
1. 1.2
2. 3.4
3. 2.4
4. 6.8
5. 13.6

Question 4 Using these 2 classes, write the output of the following program:

```
public class CDPlayer {
        private int totalTime;

        public CDPlayer() {
                totalTime = 0;
        }

        public int totalPlayTime() {
                return totalTime;
        }

        public void play(CDTrack aTrack) {
                totalTime += aTrack.getPlayTime();
        }
}
```

```
public class CDTrack {
        private String myTitle;
        private int myPlayTime, myTimesPlayed;

        public CDTrack(String trackTitle, int playTime) {
                myTitle = trackTitle;
                myPlayTime = playTime;
                myTimesPlayed = 0;
        }

        public int getPlayTime() {
                return myPlayTime;
        }

        public void wasPlayed() {
                myTimesPlayed++;
        }

        public String toString() {
                String result = "";
                int minutes = myPlayTime / 60;
                int seconds = myPlayTime % 60;
                result += myTitle + " " + minutes + ":" + seconds;
                result += " #plays = " + myTimesPlayed;
                return result;
        }
}

public class RunCDPlayer {
        public static void main(String[] args) {
                CDTrack t1 = new CDTrack("Day Tripper", 150);
                CDTrack t2 = new CDTrack("We Can Work it Out", 200);
                CDTrack t3 = new CDTrack("Paperback Writer", 138);

                CDPlayer diskPlayer = new CDPlayer();
                t1.wasPlayed();
                diskPlayer.play(t1);
                t2.wasPlayed();
                diskPlayer.play(t2);
                t1.wasPlayed();
                diskPlayer.play(t1);

                System.out.println(t1.toString());
                System.out.println(t2.toString());
                System.out.println(t3.toString());
                System.out.println("Total play time: " +
                        (diskPlayer.totalPlayTime() / 60) + ":" +
                        (diskPlayer.totalPlayTime() % 60));
        }
}
```

Answers:
Day Tripper 2:30 #plays = 2
We Can Work it Out 3:20 #plays = 1
Paperback Writer 2:18 #plays = 0

Total play time: 8:20

CS1400 Review Questions

Static Variables and Methods

Question 1 What is a static variable? What is a static method?
Answer: A static variable is shared among all instances of a class (belong to the class not to the instance). A static method operates on static fields and is invoked using the class name.

Question 2 Using the code below, how many copies of the variable number exist after instantiating 374 different AmazingClass objects?

```
public class AmazingClass {
        private static int number;

        public AmazingClass(int a) {
                number = a;
        }

        public int twice() {
                number *= 2;
                return number;
        }
}
```

Answer: 1

Question 3 Using the code from above, what is the value of number after each of the following statements? (For each part, assume the preceding parts have already been executed).

```
AmazingClass ac1 = new AmazingClass(3);
AmazingClass ac2 = new AmazingClass(7);
ac1.twice();
ac2.twice();
```

Answers:
3
7
14
28

CS1400 Review Questions

Method Overloading

Question 1 What is method overloading? Answer: Overloading is when there are 2 or more methods with the same name in the same class, but with different signatures (not headers).

Question 2 What are the valid method headings assuming they are written in the same class?

a) `public void Void()`
b) `public double void f2 ()`
c) `public double sum(int left, right)`
d) `public String string(int n)`
e) `public BankAccount bankAccount()`

Answers: a d, e

CS1400 Review Questions

Arrays

Question 1 What are the indices for the first and last positions of any array?
Answers: x[0], x[x.length - 1]

Question 2 Immediately after instantiating a new array of primitives (ints, doubles, etc.), what fills the array(default initialization)? What about an array of objects?
Answers: 0, null

Question 3 What happens when you try to access an array element past the end of the array?
Answer: The code throws an ArrayIndexOutOfBoundsException.

Question 4 Instantiate three arrays called x, y, and z of type int, String, and BankAccount (respectively), all of size 10.
Answers:

```
int[] x = new int [10];
String [] y = new String [10];
BankAccount[] z = new BankAccount[10];
```

Question 5 Write a for-loop to double each element in an array x of type int.
Answer:

```
for (int i = 0; i < x.length; i++)
        x[i] *= 2;
```

Question 6 Write code to store the largest number in an int array x into a variable called max.
Answer:

```
int max = x[0];
for (int i = 1; i < x.length; i++)
        if (x[i] > max)
                max = num [i];
```

Question 7 Write code to count how many numbers in the array are strictly larger than 4, and store that total in a variable called total.
Answer:

```
int total = 0;
for (int i = 0; i < x.length; i++)
        if ( x[ i] > 4)
                total++;
```

Question 8 Write code to print out every other element in an array separated by tabs.
Answer:

```
for (int i = 0; i < x.length; i+=2)
        System.out.println(x[i] + "\t");
```

Question 9 Write code to shift each number one place to the right (Note: there will be 2 copies of the 1st element when the code finishes).
Answer:

```
for ( int i = x. length -2; i >= 0; i--)
        x[i+1] = x[i];
```

Question 10 Write code to print the contents of an array in reverse order, one element for each line.
Answer:

```
for ( int i = x. length -1; i >= 0; i--)
        System.out.println(x[i]);
```

Question 11 Use the following array x to answer the following questions:

4 8 5 1 6 3 2

a) What value is given by x[1]?
b) What value is given by x[6]?
c) What value is given by x[7]?
d) What value is given by x.length?
Answers:
a) 8
b) 2
c) ArrayIndexOutOfBoundsException thrown
d) 7

Question 12 Use the following array x to answer the following questions:

{{4, 8}, {5, 1, 6}, {3, 7}}

a. What value is given by x.length?
b. What value is given by x[1][1]?
c. What value is given by x[2].length?
Answers:
e) 3
f) 1
g) 2