

CSCI 201L Final – Written
Fall 2016
10% of course grade



1. Inner Classes – Anonymous inner classes are very commonly used with event-driven programming in Java. There is no requirement to use them though.

- a. Give two reasons why using anonymous inner classes are beneficial. (0.5% + 0.5%)

Reason #1

The implementation is in-line with the rest of the code, making it easier to read.

Reasons #2

If you are only going to use a class one time, there is no need to create an explicit class that will only be instantiated once, decreasing memory usage.

Reason #3

With small classes, the code will be more maintainable.

Reason #4

The scope of an anonymous inner class is hidden from other methods or classes.

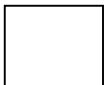
- b. Give one situation when using anonymous inner classes is not recommended. (0.5%)

Situation #1

If the class needs to be used more than once, an anonymous inner class would require copying and pasting code.

Situation #2

If an anonymous inner class is very large, the readability of the code will decrease.



2. Software Engineering – Many project managers may oppose the idea of pair programming as costing more than individual programming for producing the same number of features. Give two reasons why pair programming would not cost the company more than individual programming. (0.5% + 0.5%)

Reason #1

Less refactoring in the future from poor design.

Reason #2

Fewer bugs will be present in the code, causing less time fixing them.

Reason #3

If someone leaves the company, another person will already be knowledgeable of the code.

Reason #4

Junior programmers will become more experienced programmers faster by working with other people.



3. Networking Theory – For some odd reason, you decide to have Bruce Bruin, a UCLA student, as a roommate. Bruce tells you that you need to call the ISP to get another public IP address because there is only one public IP address right now, which is on his computer. As you start to explain how DHCP works, he asks you the following questions.

IP – 143.208.14.212

IP – 1000 1111 1101 0000 0000 1110 1101 0100

- a. “My IP address is 143.208.14.212. Could that be the external IP address on the router?” (0.5%)

Yes

- b. “What is the network address?” Provide this in the dotted IP notation, not in binary. (0.5%)

143.208.0.0

- c. “What will the subnet mask be for our internal network?” Assume that you are given one public IP address from your ISP, and you are using DHCP with private IP addresses internally for the two computers. Provide this in the dotted IP notation AND slash notation, not in binary. (0.5% + 0.5%)

255.255.255.252

143.208.14.212/30

(NOTE: Give half credit if student answered 255.255.255.254 and 143.208.14.212/31 since that would allow two IP addresses. The IP address with all 0s and all 1s for the host are reserved though, so they are not assignable addresses.)



4. Databases and SQL – Answer the following questions concerning the database below.

Here is the Book table.

bookID	title	author	isbn	numCopies
1	Tonight on the Titanic	Mary Pope Osborne	978-0-606-16894-6	3
2	Afternoon on the Amazon	Mary Pope Osborne	978-0-679-86372-9	1
3	Balto of the Blue Dawn	Mary Pope Osborne	978-0-553-51085-0	2
4	Happy Birthday, Bad Kitty	Nick Bruel	978-0-545-29863-6	2
5	Bad Kitty Does Not Like Candy	Nick Bruel	978-1-62672-230-9	1
6	Bad Kitty Drawn to Trouble	Nick Bruel	978-1-62672-117-3	2

Here is the User table.

userID	username
1	jimmy
2	joannie
3	johnny
4	jenny

Here is the CheckedOut table.

checkedOutID	bookID	userID	numCheckedOut
1	3	4	1
2	3	3	1
3	1	1	2
4	2	2	1

- a. Write the SQL code to insert 4 copies of Moby Dick by Herman Melville with an ISBN of 978-8-124-80048-5 into the Book table. **(0.5%)**

**INSERT INTO Book (title, author, isbn, numCopies)
VALUES ('Moby Dick', 'Herman Melville', '978-8-124-80048-5', 4);**

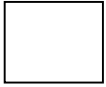
**NOTE: If double quotes are used, that's fine.
If the ISBN does not have quotation marks, deduct 0.1%.**

- b. Draw the table that is returned from the following query **after** the insert statement from part a has executed. **(0.5%)**

```
SELECT b.title, co.numCheckedOut
FROM Book b, CheckedOut co
WHERE b.bookID=co.bookID;
```

title	numCheckedOut
Tonight on the Titanic	2
Afternoon on the Amazon	1
Balto of the Blue Dawn	1
Balto of the Blue Dawn	1

**NOTE: If other books are included, deduct 0.2%.
If Balto is included only once, deduct 0.1%.**



5. **JDBC** – Give two advantages to using prepared statements with JDBC instead of just using statements. (0.5% + 0.5%)

Advantage #1

No need to worry about SQL injection because the data has been encoded.

Advantage #2

For multiple executions of the same SQL statement, it will be faster since it is compiled and executed within the DBMS.



6. **Concurrent Computing** – What is the major difference between parallel computing and distributed computing with respect to memory? (0.5%)

Parallel computing uses shared memory. Distributed computing does not use shared memory.



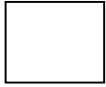
7. **Multi-Threading and Parallel Programming** – In class we talked about the primary *purpose* of multi-threading and parallel programming. What are they? (0.5% + 0.5%)

Primary purpose of multi-threaded programming

Add functionality to the program.

Primary purpose of parallel programming

Make our program execute in less time.



8. **Multithreading** – Give two rules that will always be true about the output of the following program. (0.5% + 0.5%)

```
import java.util.ArrayList;
import java.util.concurrent.Semaphore;

public class Problem8 extends Thread {
    public static ArrayList<Integer> al = new ArrayList<Integer>();
    public static Semaphore sem = new Semaphore(4);
    private int num;
    public Problem8(int num) {
        this.num = num;
    }
    public void run() {
        try {
            sem.acquire();
            System.out.println(num + " starting ");
            for (int i=0; i < al.size(); i++) {
                System.out.println(al.get(i));
            }
        } catch (InterruptedException ie) {
        } finally {
            System.out.println(num + " ending ");
            sem.release();
        }
    }
    public static void main(String[] args) {
        for (int i=0; i < 5; i++) {
            al.add(i);
        }
        for (int i=0; i < 100; i++) {
            Problem8 p8 = new Problem8(i);
            p8.start();
        }
    }
}
```

Rule #1

The “starting” line will always come before the “ending” line for a given thread.

Rule #2

We will never have all five threads say “starting” before at least one of them says “ending”.

- 9. Distributed Programming** – RMI requires a security policy to be set on both server and client RMI programs. Explain why client RMI programs need to have a security policy set. **(1.0%)**

An object is returned from an RMI call, which can contain methods. The body of those methods is determined by the server, so there needs to be a security policy on the client to regulate what that program can do on the client computer.

Extra Credit Questions

Extra credit is applied after the curve so does not affect other students.

- 10. Extra Credit** – This is the first semester that we assigned students in the group project in an attempt to more accurately mimic the real world. Do you think that was a good decision or do you think it would have been better for students to be able to select their own groups? Explain your answer. **(0.5%)**