Name _____ ID _____ Final Score _____
Extra Credit _____

Section (circle one): MW 8:30-9:50 TTh 9:30-10:50 TTh 11:00-12:20

CSCI 201L Final – Written
Spring 2017
12% of course grade

1. Servlets – Explain the difference between a GET and POST form submission. Give one reason why a programmer would choose to use a GET and one reason why a programmer would choose to use a POST. **(0.5% + 0.5% + 0.5%)**

Difference

Why programmer would choose to use GET

Why programmer would choose to use POST

2. Software Engineering – The Mythical Man-Month by Fred Brooks claims that it takes 9 times as long to create a software product system compared to just creating a program. Give two reasons why it takes significantly longer to create a software product system. **(0.5% + 0.5%)**

Reason #1

Reason #2

3. AJAX and Web Sockets – AJAX and Web Sockets both allow a web page to be updated without needing to refresh the page. Explain what AJAX is and what Web Sockets are. Why would a programmer choose to use one over the other? **(0.5% + 0.5% + 0.5% + 0.5%)**

Define AJAX

Define Web Sockets

Why programmer would choose AJAX

Why programmer would choose Web Sockets

4. Concurrent Programming - What is the primary goal of each of the three types of concurrent programming? **(0.5% + 0.5% + 0.5%)**

Multi-threading

Parallel

Distributed

5. Networking Theory – Assume you are given the following IP address and subnet mask.

```
IP –          120.192.168.50
IP –          0111 1000  1100 0000  1010 1000  0011 0010
Subnet Mask – 255.255.248.0
Subnet Mask – 1111 1111  1111 1111  1111 1000  0000 0000
```

a. What class IP address is given? What is the network address? **(0.5%)**

b. Is the IP address public or private? **(0.5%)**

c. How many hosts can be on the subnetwork? **(0.5%)**

d. What is the network and subnetwork combination? **(0.5%)**

6. Synchronization – Explain how the following code can throw a `ConcurrentModificationException`. **(0.5%)**

```
1  class Question6 extends Thread {
2    private static Set<Integer> hashSet =
3            Collections.synchronizedSet(new HashSet<Integer>());
4    private static Lock lock = new ReentrantLock();
5    public Question6(int num) {
6      hashSet.add(num);
7    }
8    public void run() {
9      lock.lock();
10     try {
11       Iterator<Integer> iterator = hashSet.iterator();
12       while (iterator.hasNext()) {
13         System.out.print(iterator.next() + " ");
14       }
15     } finally {
16       lock.unlock();
17     }
18   }
19 }
```

7. **Locks –** In the following code, assume a thread calls the method `foo()`. Answer the questions that follow the code. **(0.25% + 0.25% + 0.25% + 0.25%)**

```
1  import java.util.concurrent.locks.Lock;
2  import java.util.concurrent.locks.ReentrantLock;
3  public class Question7 {
4      private Lock lock = new ReentrantLock();
5      public void foo() {
6              try {
7                      lock.lock();
8                      System.out.println("foo 1");
9                      bar();
10                     System.out.println("foo 2");
11             } finally {
12                     lock.unlock();
13             }
14     }
15
16     public void bar() {
17             try {
18                     lock.lock();
19                     System.out.println("bar");
20             } finally {
21                     lock.unlock();
22             }
23     }
24
25     public static void main(String [] args) {
26             Question7 q7 = new Question7();
27             q7.foo();
28     }
29 }
```

a. Does `foo 1` get printed? ☐ Yes ☐ No

b. Does `bar` get printed? ☐ Yes ☐ No

c. Does `foo 2` get printed? ☐ Yes ☐ No

d. If yes, explain why `foo 2` is printed. If not, what happens?

8. Multi-Threaded Programming – Look at the following code then answer the questions below. **(0.5% + 0.5%)**

```
1  import java.util.concurrent.locks.Lock;
2  import java.util.concurrent.locks.ReentrantLock;
3
4  public class Question8 {
5      private Lock lock = new ReentrantLock();
6      public synchronized void foo() {
7              try {
8                      lock.lock();
9                      System.out.println("foo");
10             } finally {
11                     lock.unlock();
12             }
13     }
14     public void bar() {
15             try {
16                     lock.lock();
17                     synchronized(this) {
18                             System.out.println("bar");
19                     }
20             } finally {
21                     lock.unlock();
22             }
23     }
24 }
```

a. Is there a chance of deadlock? ☐ Yes ☐ No

b. If yes, explain how? If no, what are all the possible outputs?

9. Conditions – There are two ways to wake up a thread that is waiting on a condition – `signal()` and `signalAll()`. Since we don't have control over the order threads are switched into the CPU from the Ready state, why would we ever call `signal()` instead of `signalAll()`? **(0.5%)**

10. 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 represent `jenny` checking out the book Happy Birthday, Bad Kitty. **(0.5%)**

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

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

Extra Credit Questions

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

☐ **Extra Credit –** For the final project, we required weekly meetings with your assigned CP. **(0.25%)**

Did you think these meetings were beneficial? ☐ Yes ☐ No

Please explain.

☐ **Extra Credit –** This is the first semester we have included web development in the course. **(0.25%)**

Do you think this was a positive change? ☐ Yes ☐ No

How do you think we can improve on this change?