ECE 39595J Fall 2020 Second Exam Answer Sheet
Put your name somewhere on this sheet.

1.	21.
2.	22.
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20.	40.

ECE 39595J Fall 2020, Test 2

The first page is the answer sheet. You can annotate it and turn it in, you can turn in the entire exam with the answer sheet annotated, you can answer on a piece of scratch paper and turn in a .pdf (preferably) or as a .jpg.

You may begin the exam whenever it becomes available. I will give a 10 minute warning – at the end of that the exam answer sheet needs to have already been uploaded to Brightspace.

If you are not in zoom with video turned on you may recieve a 0 on the exam. I will be recording the exam. Check the Zoom chat box periodically for corrections.

Programs are be given without import statements for brevity. Assume all needed imports are present. You may use newlines in your answer, or not, without affecting your score.

Each question is worth 2.5 points.

By taking and turning in a test answer sheet to be graded, you agree that: I have neither given nor received help during this exam from any other person or electronic source (other than my own notes, viewing the exam and using an electronic device to annotate the answer sheet with my answers), and I understand that if I have I will be guilty of cheating and will fail the exam and possibly the course.

This program has questions 1 - 9. If something is printed by a line that is a question (has a Qx comment, where "x" is a number) say what is printed. If the line has an error at either compile or runtime, answer "Err" and assume the statement doesn't exist when answering other questions. If the statement prints nothing but is correct, answer "Ok". If a value is unitialized, answer "uninit".

```
public interface I1 {
   abstract void f1( );
}

public abstract class A1 {

   public abstract void a1( );
   public abstract void b1( );

   public void c1( ) {
      System.out.println("c1");
   }
}

public abstract class A2 {

   public abstract void a2( );
   public abstract void b2( );
   public void c2( ) {
      System.out.println("A2.c2");
   }
}

public class C1 extends A1 {

   public void a1( ) {
      System.out.println("C.a1");
   }
}

public class C2 implements I1 {

   public void f1( ) {
      System.out.println("C2.f1");
   }
}
```

```
class C3 extends C2 implements I1 {
   public void c3( ) {
      System.out.println("c3");
   }
}

public class C4 implements I1 {
   public void f1( ) {
      System.out.println("C4.f1");
   }
}

public class Main {

   public static void main(String[ ] args) {
      A1 a1 = new A1( ); // Q1
      C2 c2 = new C2( ); // Q2
      C3 c3 = new C3( ); // Q3
      C4 c4 = new C4( ); // Q4
      I1 i1 = new C3( ); // Q5
      i1.f1( ); // Q6
      I1 i1a = new C4( ); // Q7
      i1a.f1( ); // Q8
   }
}
```

Q9: is C1 a legal class?

This pagprogra has qestions 10 - 16. If something is printed by a line that is a question (has a Qx comment, where "x" is a natural number) say what is printed. If the line has an error at either compile or runtime, answer "Err" and assume the statement doesn't exist when answering other questions. If the statement prints nothing but is correct, answer "Ok". If a value is unitialized, answer "uninit".

```java
public interface I1 {

    public abstract void f1( );

    public void g1( ) {
        System.out.println("g1");
    }
}

public interface I2 {

    public abstract void f2( );
}

public interface I3 extends I2 {
    public abstract void g3( );
}

public interface I4 {
    public abstract void f4( );
    public abstract void g4( );
}

public class C implements I4 {

    public void f4( ) {
        System.out.println("C.f4");
    }

    public void g4( ) {
        System.out.println("C.g4");
    }
}

public class Main {

    public static void main(String[ ] args) {
        I3 i3 = new I3( ); // Q10
        C c = new C( ); // Q11
        I4 i4 = new C( ); // Q12
        i4.f4( ); // Q13
    }
}
```

Q14: Is I1 a legal interface? (answer yes or no)
Q15: Is I3 a legal interface? (answer yes or no)
Q16: If I3 and I2 are legal interfaces, what methods must be implemented by a concrete class C that implements I2 and I3 (answer A, B, C or D):

    A. void f2( )

B. void g3( )

C. void f2( ) and void g3( );

D. neither void f2( ) nor void g3( ) as long as they aren't called from C objects.

This page has questions 17 - 21.

```java
public class E0 extends Exception { }

public class E1 extends Exception { }

public class E2 extends Exception { }

public class E3 { }

public class Thrower {

   public void f0( ) throws E0 {
      throw new E0( );
   }

   public void f1( ) throws E1 {
      throw new E1( );
   }

   public void f2( ) throws E2 {
      throw new E2( );
   }

   public void f3( ) { // throws E3 {
      throw new E3( );
   }
}
```

```java
public class Main {

   public static void main(String[ ] str)
      throws E0, E1, E2 {

      Thrower thrower = new Thrower( );

      for (int i = 0; i < 3; i++) {
         try {
            if (i == 0) thrower.f0( );
            if (i == 1) thrower.f1( );
            if (i == 2) thrower.f2( );
         } catch (E0 e1) {System.out.println("E0");
         } catch (E1 e2) {System.out.println("E1");
         } finally {
            System.out.println("Finally");
         }
      }
   }
}
```

Q17. What is printed in iteration i = 0 of the loop in main?
Q18. What is printed in iteration i = 1 of the loop in main?
Q19. What is printed in iteration i = 2 of the loop in main?
Q20. How many times is finally printed?
Q21. Does the program terminate normally or with a stack trace printed?

This page has question 22 – 24.

```java
public class MyClass {
   private int val;

   public MyClass(int i) {
      val = i;
   }

   public int getVal( ) {
      return val;
   }
}
import java.util.List;
import java.util.ArrayList;

public class Main {

   public static void main(String[ ] args) {
      List<MyClass> myList = new ArrayList<MyClass>( );
      myList.add(new MyClass(0));
      myList.add(new MyClass(1));
      myList.add(new MyClass(1));
      // Note: List guarentees iterators retrieve elements
      // in order, from the list fron to the rear
      for (MyClass m : myList) {
         System.out.print(" "+m.getVal( ));  // Q22 what is
      }               // printed by all iterations of the loop
      System.out.println( );
   }
}
```

Q23. what is the type of myList? (answer A, B or C)

   A. List

   B. ArrayList

   C. both ArrayList and List, since ArrayList implements List

Q24. What is the type of elements stored in myList? (answer A or B)

   A. MyList objects

   B. MyList references

This page has question 25.

```
public class Work implements Runnable {

   private String letter;

   public Work(String str) {
      letter = str;
   }

   public synchronized void worker( ) {
      for (int i = 0; i < 25; i++) {
         Main.str += letter;
       prograry {
            Thread.sleep(40);
         } catch (Exception e) { }
      }
   }
   public void run( ) {
      worker( );
   }
}
```

```
public class Main {
   static String str = "";

   public static void main(String[ ] args)
      throws InterruptedException {
      Thread t1 = new Thread(new Work("a"));
      Thread t2 = new Thread(new Work("b"));
      t1.start( );
      t2.start( );

      t1.join( );
      t2.join( );

      System.out.println(str);
   }
}
```

Q25. Does the System.out.println(str) statement print (answer A, B, C or D):

  A. It will always print all a's followed by all b's

  B. It will always print all b's followed by all a's

  C. It will print one of:

      i. all a's followed by all b's, or
      ii. all b's followed by all a's.

  D. It will print one of:

      i. all a's followed by all b's, or
      ii. all b's followed by all a's, or
      iii. a's and b's interspersed, i.e., all of the a's and b's will not be contiguous.

This page has questions 26.

```
public class Work implements Runnable {

  private String letter;
  private Object obj;

  public Work(String str, Object _obj) {
     letter = str;
     obj = _obj;
  }

  public void worker( ) {
     synchronized(obj) {
        for (int i = 0; i < 25; i++) {
           Main.str += letter;
           try {
              Thread.sleep(40);
           } catch (Exception e) { }
        }
     }
  }
  public void run( ) {
     worker( );
  }
}
```

```
public class Main {
    static String str = "";

    public static void main(String[ ] args)
       throws InterruptedException {
       Object obj = new Object( );
       Thread t1 = new Thread(new Work("a", obj));
       Thread t2 = new Thread(new Work("b", obj));

       t1.start( );
       t2.start( );

       t1.join( );
       t2.join( );

       System.out.println(str);
    }
}
```

Q26. Does the System.out.println(str) statement print (answer A, B, C or D):

A. It will always print all a's followed by all b's

B. It will always print all b's followed by all a's

C. It will print one of:

    i. all a's followed by all b's, or

    ii. all b's followed by all a's.

D. It will print one of:

    i. all a's followed by all b's, or

    ii. all b's followed by all a's, or

    iii. a's and b's interspersed, i.e., all of the a's and b's will not be contiguous.

This page has question 27.

```
public class Work implements Runnable {

   private String letter;

   public Work(String str) {
      letter = str;
   }

   public void worker( ) {
      for (int i = 0; i < 25; i++) {
         Main.str += letter;
         try {
             Thread.sleep(40);
         } catch (Exception e) { }
      }
   }
   public void run( ) {
      worker( );
   }
}
```

```
public class Main {
    static String str = "";

    public static void main(String[ ] args)
       throws InterruptedException {
       Object obj = new Object( );
       Thread t1 = new Thread(new Work("a"));
       Thread t2 = new Thread(new Work("b"));
       t1.run( );
       t2.run( );
       t1.join( );
       t2.join( );
       System.out.println(str);
    }
}
```

Q27. Does the System.out.println(str) statement print (answer A, B, C or D):

A. It will always print all a's followed by all b's

B. It will always print all b's followed by all a's

C. It will print one of:

    i. all a's followed by all b's, or

    ii. all b's followed by all a's.

D. It will print one of:

    i. all a's followed by all b's, or

    ii. all b's followed by all a's, or

    iii. a's and b's interspersed, i.e., all of the a's and b's will not be contiguous.

This page has question 28.

```
public class Work implements Runnable {

   private String letter;

   public Work(String str) {
      letter = str;
   }

   public void worker( ) {
      for (int i = 0; i < 25; i++) {
         Main.str += letter;
         try {
            Thread.sleep(40);
         } catch (Exception e) { }
      }
   }
   public void run( ) {
      worker( );
   }
}
```

```
public class Main {
    static String str = "";

    public static void main(String[ ] args)
       throws InterruptedException {
       Thread t1 = new Thread(new Work("a"));
       Thread t2 = new Thread(new Work("b"));
       t1.start( );
       t1.join( );
       t2.start( );
       t2.join( );
       System.out.println(str);
    }
}
```

Q28. Does the System.out.println(str) statement print (answer A, B, C or D):

A. It will always print all a's followed by all b's

B. It will always print all b's followed by all a's

C. It will print one of:

    i. all a's followed by all b's, or

    ii. all b's followed by all a's.

D. It will print one of:

    i. all a's followed by all b's, or

    ii. all b's followed by all a's, or

    iii. a's and b's interspersed, i.e., all of the a's and b's will not be contiguous.

This program has questions 29 - 33. If something is printed by a line that is a question (has a Qx comment, where "x" is a natural number) say what is printed. If the line has an error at either compile or runtime, answer "Err" and assume the statement doesn't exist when answering other questions. If the statement prints nothing but is correct, answer "Ok". If a value is unitialized, answer "uninit".

```
public class C {
   public static int s = 0;
   public int val = 0;

   public C( ) {
      s++;
      val++;
      System.out.println("s: "+s+", val: "+val);
   }

   public void foo( ) {
      System.out.println("foo s: "+s+", val: "+val);
   }

   public static void bar(C c) {
      System.out.println("foo s: "+s+", val: "+val);
   }

   public static void func(C c) {
      System.out.print("val: "+c.val);
   }
}
public class Main {
    public static void main(String[ ] args) {
       System.out.println("C.s: "+C.s);
       C c1 = new C( ); // Q29
       C c2 = new C( ); // Q30
       c1.func(c2);   // Q31
   }
}
```

Q32. Is C.bar( ) a legal function or will there be compile time errors with it? (answer "yes" or "no".
Q33. Is C.foo( ) a legal function or will there be compile time errors with it? (answer "yes" or "no".

This program has questions 34 - 40. If something is printed by a line that is a question (has a Qx comment, where "x" is a number) say what is printed. If the line has an error at either compile or runtime, answer "Err" and assume the statement doesn't exist when answering other questions. If the statement prints nothing but is correct, answer "Ok". If a value is unitialized, answer "uninit".

```
public class B {
   int i = 0;
   int j = 0;

   B( ) {
      System.out.println("B");
      i = 2;
      j = 4;
   }

   public void f1( ) {
      System.out.println("B.f1");
      f3( );
   }

   public void f2( ) {
      System.out.println("B.f2");
   }

   private void f3( ) {
      System.out.println("B.f3");
   }
}

public class D extends B {
   int i = 0;

   D( ) {
      System.out.println("D");
      i = 6;
   }

   public void f2( ) {
      System.out.println("D.f2");
   }

   public void f4( ) {
      System.out.println("D.f4");
   }

   private void f3( ) {
      System.out.println("D.f3");
   }
}
```

```
public class Main {

   public static void main(String[ ] args) {
      D d = new D( ); // Q34
      B b = d;

      b.f1( ); // Q35
      b.f2( ); // Q36
      b.f3( ); // Q37
      b.f4( ); // Q38

      d.f1( ); // Q39
      d.f2( ); // Q40
   }
}
```