CS 1331 Final Exam

Study Guide

Completely fill in the box corresponding to your answer choice for each question.

1. [ A ] [ B ] [ C ] [ D ]
2. [ A ] [ B ] [ C ] [ D ]
3. [ A ] [ B ] [ C ] [ D ]
4. [ A ] [ B ] [ C ] [ D ]
5. [ A ] [ B ] [ C ] [ D ]
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9. [ A ] [ B ] [ C ] [ D ]
10. [ A ] [ B ] [ C ] [ D ]
11. [ A ] [ B ] [ C ] [ D ]
12. [ A ] [ B ] [ C ] [ D ]
13. [ A ] [ B ] [ C ] [ D ]
14. [ A ] [ B ] [ C ] [ D ]
15. [ A ] [ B ] [ C ] [ D ]
16. [ A ] [ B ] [ C ] [ D ]
17. [ A ] [ B ] [ C ] [ D ]
18. [ A ] [ B ] [ C ] [ D ]
19. [ A ] [ B ] [ C ] [ D ]
20. [ A ] [ B ] [ C ] [ D ]
21. [ A ] [ B ] [ C ] [ D ]
22. [ A ] [ B ] [ C ] [ D ]
23. [ A ] [ B ] [ C ] [ D ]
24. [ A ] [ B ] [ C ] [ D ]
25. [ A ] [ B ] [ C ] [ D ]
26. [ A ] [ B ] [ C ] [ D ]
27. [ A ] [ B ] [ C ] [ D ]
28. [ A ] [ B ] [ C ] [ D ]
29. [ A ] [ B ] [ C ] [ D ]
30. [ A ] [ B ] [ C ] [ D ]
31. [ A ] [ B ] [ C ] [ D ]
32. [ A ] [ B ] [ C ] [ D ]
33. [ A ] [ B ] [ C ] [ D ]
34. [ A ] [ B ] [ C ] [ D ]
35. [ A ] [ B ] [ C ] [ D ]
36. [ A ] [ B ] [ C ] [ D ]
37. [ A ] [ B ] [ C ] [ D ]

Number missed: ______ Final Score: ______
public class Kitten {

    private String name = "";

    public Kitten(String name) {
        name = name;
    }

    public String toString() {
        return "Kitten: " + name;
    }

    public boolean equals(Object other) {
        if (this == other) return true;
        if (null == other) return false;
        if (!(other instanceof Kitten)) return false;
        Kitten that = (Kitten) other;
        return this.name.equals(that.name);
    }
}

Assume the following statements have been executed:

Object maggie = new Kitten("Maggie");
Object fiona = new Kitten("Fiona");
Object fiona2 = new Kitten("Fiona");

[3] 1. What is the value of maggie?
   A. the address of a Kitten object
   B. null
   C. automatically set to 0
   D. undefined

[3] 2. What is printed on the console after the following statement is executed?
   System.out.println(maggie.toString());
   A. Kitten: 
   B. Kitten: null
   C. Kitten: Maggie

[3] 3. What is the value of the expression fiona.equals(fiona2)?
   A. true
   B. false

[3] 4. What is the value of the expression fiona.equals(maggie)?
   A. true
   B. false

[3] 5. After executing Kitten[] kittens = new Kitten[5]; , what is the value of kittens[0]?
   A. null
   B. the address of a Kitten object
   C. automatically set to 0
   D. undefined
public class Doberman {
    private static int dobieCount = 0;
    private String name;

    public Doberman(String name) {
        this.name = name;
        dobieCount++;
    }
    public String reportDobieCount() {
        return name + " says there are " + dobieCount + " dobies.";
    }
    public boolean equals(Doberman other) {
        return this.name.equals(other.name);
    }
}

[3] 6. If no Doberman instances have been created, what is true about the following line from another class?

    System.out.println("dobieCount: " + Doberman.dobieCount);

    A. It will not compile.
    B. It will compile but will cause a ClassCastException at run-time.
    C. It will print “dobieCount: 0”

[3] 7. What would be printed to the console after executing the following statements?

    Doberman fido = new Doberman("Fido");
    Doberman chloe = new Doberman("Chloe");
    System.out.println(chloe.reportDobieCount());
    Doberman prince = new Doberman("Prince");

    A. Chloe says there are 1 dobies.
    B. Chloe says there are 2 dobies.
    C. Chloe says there are 3 dobies.

[3] 8. What would be printed to the console after executing the following statements?

    ArrayList daringDobermans = new ArrayList();
    daringDobermans.add(new Doberman("Chloe"));
    System.out.println(daringDobermans.contains(new Doberman("Chloe")));

    A. true
    B. false

[3] 9. What would be printed to the console after executing the following statements?

    ArrayList daringDobermans = new ArrayList();
    Doberman chloe = new Doberman("Chloe");
    daringDobermans.add(chloe);
    System.out.println(daringDobermans.contains(chloe));

    A. true
    B. false


    A. Something like “Doberman@deadbeef”
    B. “Chloe”
    C. null
public class Super {
    protected int x = 1;
}

public class Duper extends Super {
    protected int y = 2;

    public Duper(int n) { x += y + n; }

    public String toString() { return new Integer(x).toString(); }
}

public class Andes {
    static int a = 0;
    static boolean incA() { return ++a > 0; }

    public static void main(String[] args) {
        boolean b = Boolean.parseBoolean(args[0]);
        System.out.println( b && incA() ? new Duper(a) : new Duper(a + 1));
    }
}

[3] 11. What is printed when java Andes true is executed on the command line?
    A. 3
    B. 4
    C. 5

[3] 12. What is printed when java Andes false is executed on the command line?
    A. 3
    B. 4
    C. 5

For the next two questions, change line 3 in Andes.java to
    static boolean incA() { return a++ > 0; }

[3] 13. What is printed when java Andes true is executed on the command line?
    A. 3
    B. 4
    C. 5

[3] 14. What is printed when java Andes false is executed on the command line?
    A. 3
    B. 4
    C. 5

[3] 15. Will the expression new Duper() compile?
    A. Yes
    B. No
Assume Trooper is defined as follows:

```java
public class Trooper {
    private String name;    
    private boolean mustached;
    public Trooper(String name, boolean hasMustache) {
        this.name = name; this.mustached = hasMustache;
    }
    public String getName() { return name; }
    public boolean hasMustache() { return mustached; }

    public boolean equals(Trooper other) {
        if (this == other) return true;
        if (null == other || !(other instanceof Trooper)) return false;
        Trooper that = (Trooper) other;
        return this.name.equals(that.name) && this.mustached == that.mustached;
    }
    public int hashCode() { return 1; }
}
```

And the following has been executed in the same scope as the code in the questions below:

```java
ArrayList<Trooper> troopers = new ArrayList<>();
troopers.add(new Trooper("Farva", true));
troopers.add(new Trooper("Farva", true));
troopers.add(new Trooper("Rabbit", false));
troopers.add(new Trooper("Mac", true));
```

16. What would be the result of the statement `Collections.sort(troopers)`?
   A. The code will not compile.
   B. troopers will be sorted in order by name.
   C. troopers will be sorted in order by mustache, then name.
   D. troopers will not have any duplicate elements.

17. After executing the statement `Set<Trooper> trooperSet = new HashSet<>(troopers)`, what would be the value of `trooperSet.contains(new Trooper("Mac", true))`?
   A. The code will not compile.
   B. true
   C. false
   D. void

18. Given the definitions of troopers and trooperSet above, what would `trooperSet.size()` return?
   A. 3
   B. 4

19. After the statement `Set<String> stringSet = new HashSet<>(Arrays.asList("meow", "meow"))` executes, what would be the value of `stringSet.size()`?
   A. 1
   B. 2

   A. true
   B. false
Given the following class definitions:

```java
public abstract class Animal {
    public abstract void speak();
    public int legs() { return 4; }
}

public class Mammal extends Animal {
    public void speak() { System.out.println("Hello!"); }
}

public class Canine extends Mammal {
    public void speak() { System.out.println("Grr!"); }
}

public class Dog extends Canine {
    public void speak(String to) { System.out.println("Woof, " + to); }
}

public class Cat extends Mammal {
    public void speak() { System.out.println("Meow!"); }
}
```

21. Say we write a subclass of Mammal named Kangaroo in which we want to override the legs method. Which of the following methods overrides legs?
   A. public void legs() { System.out.println(2); }
   B. public Object legs() { return new Integer(2); }
   C. public double legs() { return 2; }
   D. None of the above.

22. Which of the following is an invocation of the method public void pet(Canine c)?
   A. pet(new Dog())
   B. pet(new Cat())
   C. pet(new Mammal())
   D. pet(new Animal())

23. Assuming Mammal fido = new Dog(); has been executed, what does fido.speak() print?
   A. Hello!
   B. Woof! Woof!
   C. Meow!
   D. None of the above.

24. Assuming Mammal fido = new Dog(); has been executed, what does ((Mammal) fido).speak() print?
   A. Grr!
   B. Hello!
   C. Woof! Woof!
   D. Meow!

25. Assuming the statement Mammal sparky = new Mammal(); has been executed, which of the following statements will compile but cause a ClassCastException at run-time?
   A. Dog fido = (Dog) sparky;
   B. Mammal fido = new Dog();
   C. Dog fido2 = (Dog) new Dog();
   D. Cat c = new Dog()
Given the following classes, which have no-arg constructors:

```java
public class A extends Throwable { ... }
public class B extends A { ... }
public class C extends RuntimeException { ... }
```

[3] 26. Which of the following will not compile?

A. ```java
A foo(B b) throws C {
    if (true) throw new C();
    return new B();
}
```

B. ```java
A baz(B b) throws B {
    if (true) throw new A();
    return new B();
}
```

[3] 27. Which of the following will not compile?

A. ```java
A foo(B b) throws C {
    if (true) throw new B();
    return new B();
}
```

B. ```java
A bar(B b) throws C {
    if (true) throw new RuntimeException("c");
    return new B("c");
}
```

C. ```java
A baz(B b) throws A {
    if (true) throw new A("a");
    return new B("c");
}
```

[3] 28. Given the method signature `A bar(B q) throws C`, will this code compile?

```java
A m() throws C {
    return bar(new B());
}
```

A. Yes
B. No

[3] 29. Given the method signature `A bar(B q) throws B`, which of the following will not compile?

A. ```java
A m() throws C {
    return bar(new B());
}
```

B. ```java
A m() throws Throwable {
    return bar(new B());
}
```

C. All of the above will compile.

[3] 30. What is the highest superclass of all exceptions?

A. `java.lang.Object`
B. `java.lang.Throwable`
C. `java.lang.Exception`
Given the following definitions:

```java
public interface Predicate<T> {
    boolean test(T t);
}

static <E> E find(List<E> es, Predicate<E> p) {
    for (E e: es) if (p.test(e)) return e;
    return null;
}

public interface Function<T, R> {
    R apply(T t);
}

static <E, R> List<R> map(List<E> es, Function<E, R> f) {
    List<R> result = new ArrayList<>();
    for (E e: es) result.add(f.apply(e));
    return result;
}
```

and the list:

```java
List<String> words = Arrays.asList("Welcome", "To", "Java", "8");
```

31. Which of the following expressions would return the first word in `words` that starts with an upper case character?
   A. `find(words, s -> Character.isUpperCase(s.charAt(0)))`
   B. `find(map(words, String::split), a -> a[0].isUpperCase())`
   C. `find(words, s -> s.toUpperCase())`
   D. All of the above.

32. Which of the following expressions would return a list of the lengths of the words in `words`?
   A. `map(words, (String s) -> s.length())`
   B. `map(words, String::length)`
   C. `map(map(words, s -> s.split("")), a -> a.length)`
   D. All of the above.

33. Is `Comparable<T>` a functional interface?
   A. Yes
   B. No
34. What is true about this code?

```java
public static int fac(int n) {
    if (n >= 1) return 1;
    else return n * fac(n + 1);
}
// ...
int fac5 = fac(5);
```

A. Compiles and runs without errors or exceptions.
B. Compiles but program terminates with an error or exception.

35. Given the method \(f\) above, what is \(f(5)\)?

A. 0
B. 4
C. 5
D. 120

```java
public static int f(int n) {
    if (n < 0) throw new IllegalArgumentException("n < 0");
    if (n <= 1) {
        return n;
    } else {
        return f(n - 1) + f(n - 2);
    }
}
```

36. Given the partial `ArrayListQueue` implementation above, which of the following statements for line 5 would implement `enqueue` in \(O(1)\) time? Do not consider any particular implementation for `dequeue`.

A. `elems.add(item);`
B. `elems.add(0, item);`
C. `return elems.remove(elems.size() - 1);`

37. Given the partial `ArrayListQueue` implementation above, which of the following statements for line 5 would implement `enqueue` in \(O(n)\) time? Do not consider any particular implementation for `dequeue`.

A. `elems.add(item);`
B. `elems.add(0, item);`
C. `return elems.remove(elems.size() - 1);`