

Preface:

The second midterm exam for the Spring 2024 semester will be held Thursday April 11 during your enrolled section. I have made this as additional practice for you, I tend to try and make the questions **MORE** difficult than you will see on the exam but I obviously cannot guarantee that. I have **NOT** seen the exam prior to you taking the exam, that will be the first time I have looked at the exam. Any questions you see on this practice material that also show up on the exam is **PURELY COINCIDENTAL** as I develop all of my material independently. I will post solutions to this exam on my website, but it will be password protected, you will need to see me or another member of the teaching staff in person during office hours in order to receive the password. Best of luck to you! Try to take this in a quiet environment and set a timer for the allotted time of ~75 minutes.

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COMS 1004: Introduction to Computer Science and Programming in Java

Name: _____

UNI: _____

Please Use **CAPITAL LETTERS** to fill in the boxes: A B C D E

1.	2.	3.	4.	5.
6.	7.	8.	9.	10.
11.	12.	13.	14.	15.
16.	17.	18.	19.	20.
21.	22.	23.	24.	25.
26.	27.	28.	29.	30.

The first five questions ask you to provide the term, with the question being a definition. Choose the term that matches best.

1. When you provide new implementation for a method you inherited from a superclass you are:
 - a. Overriding
 - b. Overloading
 - c. Augmenting
 - d. Constructing
 - e. Instantiating
2. A homogenous collection of items which is fixed in size
 - a. vector
 - b. list
 - c. ArrayList
 - d. Array
 - e. Map
3. When discussing where a variable is accessible we are referring to it's:
 - a. scope
 - b. range
 - c. reach
 - d. limit
 - e. domain
4. A variable which has class level scope and is shared among different instances of a class is said to be what?
 - a. Instance variable
 - b. Final variable
 - c. Static variable
 - d. Abstract variable
 - e. Class Variable

5. The idea that we can use a class without knowledge of the underlying details is known as?

- a. Abstraction
- b. Encapsulation
- c. Object Oriented Programming
- d. Segmentation
- e. Mutation

6. Consider the following code segment:

```
public static void main(String[] args) {  
    String[] foo = new String[args[0].length()];  
    for(int i = 0; i < args[1].length(); i++)  
        foo[i] = args[0].substring(i,i+1);  
}
```

What must always be true in order to properly execute this code without error?

- a. `args[0].length() >= args[1].length()`
- b. `args` must have length of at least 2
- c. `args[1].length() >= args[0].length()`
- d. A and B
- e. A and C

7. I would like to get the last element of an ArrayList, what line of code does that? Assume `foo` is a valid ArrayList reference.

- a. `foo[foo.size()-1];`
- b. `foo.get(foo.length-1);`
- c. `foo[foo.length-1];`
- d. `foo.get(foo.size-1);`
- e. `foo.get(foo.size()-1);`

Questions 8-11 require you to reference the following class definition:

```
public class AudioBookCollectionRedux {

    private static int collectionID = 9999;
    private int thisCollectionID;
    private AudioBook[] myBooks;
    private double totalPrice;

    public AudioBookCollectionRedux() {
        thisCollectionID = ++collectionID;
        myBooks = new AudioBook[100];
        totalPrice = 0;
    }

    //Assume mutators and accessors for all global variables
    //Assume increaseSize is called when myBooks is full
    public void increaseSize() {
        AudioBook[] temp = new AudioBook[2 * myBooks.length];
        for (int i = 0; i < myBooks.length; i++)
            temp[i] = myBooks[i];
        myBooks = temp;
    }
}
```

8. Consider the increaseSize method: how many book object references are present after the first line runs?

- a. 100
- b. 300
- c. 200
- d. 400
- e. None of the above

9. Of those references, how many point to null?

- a. 200
- b. 100
- c. 300
- d. 400
- e. None of the above

10. Consider question 9 but after the for-loop runs in its entirety

- a. 400
- b. 100
- c. 300
- d. 200
- e. None of the above

11. Consider the following driver for the class above:

```
public class Driver {  
    public static void main(String[] args) {  
        AudioBookCollectionRedux a = new AudioBookCollectionRedux();  
        AudioBookCollectionRedux b = new AudioBookCollectionRedux();  
        AudioBookCollectionRedux c = new AudioBookCollectionRedux();  
  
        System.out.print(a.getStaticMember() + " " + a.getID() + " ");  
        System.out.print(b.getStaticMember() + " " + b.getID() + " ");  
        System.out.println(c.getStaticMember() + " " + c.getID());  
    }  
}
```

What is displayed in the terminal upon successful execution?

- a. 9999 9999 10000 10000 10001 10001
- b. 10001 9999 10001 10000 10001 10001
- c. 10000 10000 10001 10001 10002 10002
- d. 10002 10000 10002 10001 10002 10002
- e. 10002 10002 10002 10001 10002 10000

12. The formal name for the implicit parameter in Java is ?

- a. self
- b. this
- c. that
- d. Object
- e. This

13. Which of the following class headers properly establishes itself as the child of ClassA and as implementer of the interface MyInterface?
- a. `public class MyClass implements MyInterface extends ClassA`
 - b. `public class MyClass extend ClassA implement MyInterface`
 - c. `public class MyClass implements ClassA extends MyInterface`
 - d. `public class MyClass extends ClassA implements MyInterface`
 - e. Both A and D
14. Consider the base 10 number 193, what is it in base 2?
- a. 11000001
 - b. 11000101
 - c. 10001111
 - d. 10011110
 - e. 01111001
15. If we wanted to pass an array of AudioBooks as a parameter to a method, how would the parameter list be defined?
- a. `(a : AudioBook[])`
 - b. `(AudioBook[] a)`
 - c. `(AudioBook a[])`
 - d. `(ArrayList<AudioBook> a)`
 - e. More than one answer is correct
16. Which of the following statements is true regarding arrays:
- I. The smallest length it can have is 0
 - II. The highest accessible index is `arr.length`
 - III. You can store primitives in arrays
- a. I only
 - b. II only
 - c. I and III
 - d. II and III
 - e. All of the Above

17. Consider the following block of code and determine the output

```
import java.io.*;
import java.util.*;

public class Foo {
    public static void main(String[] args) {
        try {
            File myFile = new File("somePath.txt");
            Scanner sc = new Scanner(myFile);
            while(sc.hasNext()) {
                System.out.println(sc.next());
            }
        } catch (Exception e) {
            System.out.println("Error 1");
        } catch (FileNotFoundException c) {
            System.out.println("Error 2");
        }
    }
}
```

- a. "Error 1"
- b. The contents of the file are printed to the console
- c. "Error 2"
- d. Compiler Error
- e. This is unknown at the runtime of the class until it runs.

18. When concerning a PrintWriter object, which of the following are true?

- I. You must close the PrintWriter for changes to save
- II. You must provide a valid file path as an argument to the constructor.
- III. PrintWriters append to files rather than overwrites with println method

- a. I, II, and III
- b. I and III
- c. I only
- d. II and III
- e. I and II

Questions 19 - 22 consider the following method:

```
//belongs in the BankAccount class
public void examMethod(BankAccount b, double a, double c) {
    deposit(a);
    b.deposit(a*c);
    a = 13;
    return a * c;
}
```

19. This code does not compile, identify the reason why?
- a. There is no implicit parameter in the second line
 - b. The deposit method accepts ints as parameters not doubles
 - c. There is a clash between the return type and the return value *
 - d. This code compiles, the question is wrong
 - e. None of the above
20. Disregard any potential errors and focus on the code itself, if b is a bank account with \$50, the calling object is a bank account with \$25. With a = 9.5 and c = 2. What is the value returned by this method?
- a. 19
 - b. 26.0
 - c. 4.0
 - d. 26
 - e. 13.0
21. Assuming the same parameters as in the last question how much is in the calling object's bank account after the method completes
- a. 34.5
 - b. 34
 - c. 35
 - d. 35.0
 - e. 26.0

22. How much is in bank account b after the method completes ?

- a. 69
- b. 69.0
- c. 31.0
- d. \$69
- e. None of the above

23. Consider the following loop:

```
for(int i = 0; i < items.length; i++) {  
    System.out.println(items[i]);  
}
```

Which of the following is an equivalent enhanced for loop:

- a.
 for(int i : items) {
 System.out.println(items[i]);
 }
- b.
 for(Integer i : items) {
 System.out.println(i);
 }
- c.
 for(int i : items.length) {
 System.out.println(i);
 }
- d. More than 1 above answer
- e. None of the above

24. What is the range of values produced by the following expression:

```
(int) (Math.random() * 52 + 5);
```

- a. [5, 52)
- b. [0, 52)
- c. [5, 57]
- d. [5, 57)
- e. [5, 56)

25. When it comes to Exceptions there are two types, what are they and what is the primary difference?
- a. Sourced and Unsourced; Sourced exceptions need not be recognized by the programmer and are solely the programmer's responsibility to handle.
 - b. Unchecked and Checked; Checked Exceptions are checked for acknowledgement or handling by the compiler while this is not true for unchecked.
 - c. Errors and Exceptions; Errors are unrecoverable instances in a Java program while you can recover from an exception.
 - d. More than 1 answer above
 - e. None of the Above
26. Recall the BankAccount archetype along with its subclasses that you saw in lecture. Based on what you know regarding the rules of Polymorphism, which of the following is a valid statement.
- a. `BankAccount b = new BankAccount(...);`
 - b. `CheckingAccount c = new BankAccount(...);`
 - c. `BankAccount d = new CheckingAccount(...);`
 - d. A and B
 - e. A and C

Questions 27-29 Concern the following Classes:

```
public class Animal {  
  
    private String kingdomType;  
  
    public Animal(String kingdomType) {  
        this.kingdomType = kingdomType;  
    }  
  
    public void eat() {  
        System.out.print("Animal Eating ");  
    }  
}
```

```

public class Dog extends Animal {
    private String breed;

    public Dog(String breed) {
        super("mammal");
        this.breed = breed;
    }

    public void eat() {
        super.eat();
        System.out.print("Dog eats. ");
    }

    public void bark() {
        System.out.print("Bark Bark ");
    }
}

```

27. Consider the following lines of code

```

Animal a = new Animal("mammal");
Animal b = new Dog("Australian Shepherd");
a.eat();
b.eat();
b.bark();

```

What is the output of the above lines of code?

- a. Animal Eating Dog Eats Bark Bark
- b. Animal Eating Animal Eating Bark Bark
- c. Dog Eats Dog Eats Bark Bark
- d. There is a compiler error
- e. None of the above

28. The eat() method in the Dog class is considered what?

- a. Overloaded
- b. Overridden
- c. Inherited
- d. Segmented
- e. None of the above

29. What phrase can be used to describe the class relationship between Dog and Animal?

- a. Dog is a Animal
- b. Animal is a Dog
- c. Animal has a Dog
- d. Dog has an Animal
- e. None of the above

30. How many parents does a Java class have ?

- a. 0 parents
- b. 1 parent
- c. Depends on the class header
- d. Infinitely many
- e. None of the above