Preface:

The first midterm exam for the Spring 2024 semester will be held Thursday February 22 during your enrolled section. Professor Cannon has already posted practice questions for you, please start with those as they will help guide your studying. 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: _____

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.

1. Consider the following code segment and determine the output produced when the code is executed:

```
public static void mystery(String s, String t) {
  for (int i = 0; i < s.length(); i++) {
    for (int j = t.length() - 1; j >= i; j--) {
      System.out.print(s.substring(i, i+1));
      System.out.print(t.substring(j, j+1) + " ");
    }
  }
}

public static void main(String[] args) {
  String fizz = "Fizz";
  String buzz = "Buzz";
  mystery(fizz, buzz);
}
```

   a. Fz Fz Fu iz iz zz
   b. Fz Fz Fu FB iz iz iu zz zz zz
   c. iz iz iu zz zz zz
   d. iz iz zz
   e. Fz Fz Fu FB zz zz

2. Which of the following boolean expressions is equivalent to:

```
!(a && b) && !(!a || !b)
```

   a. (!a && !b) && (a || b)
   b. (!a && b) && (a || !b)
   c. !a || !b && (a && b)
   d. a || b && (!a && !b)
   e. None of the Above

3. Words like “public” “int” “return” and others are known as what in java?

    a. Exclusive words
    b. Access Modifiers
    c. Class Phrases
    d. Reserved Words
    e. Sacred Incantations

4. Object Oriented Programming is a programming paradigm with lots of benefits which were mentioned in lecture. Which one is a benefit?

    a. Encapsulation
    b. Compilation
    c. Segmentation
    d. Security
    e. None of the above

For Questions 5-9 consider the following class definition:

```
public class ParkingLot {

  private String[] spots;
  private int nextAvailableSpot;

  public ParkingLot(int spotCount) {
    this.spots = new String[spotCount];
    this.nextAvailableSpot = 0;
  }

  public void addCarToLot(String car) {
    spots[nextAvailableSpot++] = car;
  }

  public String getCarFromSpot(int spot) {
    return spots[spot];
  }
}
```

5. How many instance variables are declared within the class?

   a. 5
   b. 0
   c. 3
   d. 1
   e. 2

6. How many constructors are present within the class?

   a. 5
   b. 0
   c. 3
   d. 1
   e. 2

7. How many methods are present within the class?

   a. 5
   b. 0
   c. 3
   d. 1
   e. 2

8. Assume now I was in a separate class attempting to instantiate a new ParkingLot object, how would I do that?

   a. `ParkingLot myLot = new ParkingLot(3);`
   b. `ParkingLot myLot = ParkingLot(“3”);`
   c. `myLot = new ParkingLot(3);`
   d. `myLot = ParkingLot(“3”);`
   e. `ParkingLot myLot = new ParkingLot(“3”);`

9. Which of the following is not a valid type in Java?

   a. short
   b. long
   c. integer
   d. String
   e. ParkingLot

10. Consider the following list of elements A = {1, 2, 3, 4, 5, 6} how many more comparisons does Selection Sort take to sort the list compared to insertion sort?

    a. 15
    b. 10
    c. 5
    d. 7
    e. 9

11. What is the result of the following code block?

```
public static void main(String[] args) {
  int x = 3.0 / 2;
  System.out.println(x);
}
```

    a. 1.5
    b. 1.0
    c. 1
    d. Cannot Determine
    e. None of the above

12. What is the difference between the implicit and explicit parameters?

    a. The explicit parameter provides information about the calling object while the implicit parameter specifies how to operate on the object.

    b. The explicit parameter provides information about how to operate on the object while the implicit parameter provides information about the calling object.

    c. The implicit parameter provides information about the calling object while the explicit parameters provides information to the operation being executed on the calling object.

    d. Both A and C

    e. The implicit parameter and explicit parameter are synonymous

13. The Java programming language is considered what kind of language?

a. Functional
b. Procedural
c. Object-Oriented
d. Symbolic
e. Differentiable

14. Consider the following code and determine the output when executed

```
public static void mystery(int[] m) {
  int i = 0;
  while(i < m.length){
    if (m[i] % 2 == 1) {
      m[i] = 2 * i;
    }
    System.out.print(m[i] + " ");
    i++;
  }
}

public static void main(String[] args) {
  int[] myList = {34, 14, 23, 9, 11, 90};
  mystery(myList);
}
```

a. 34 14 4 6 8 90
b. 0 2 23 9 11 10
c. 34 14 23 9 11 90
d. 0 2 4 6 8 10
e. An infinite loop occurs

15. When a method or variable has the private access modifier attached to it, what does this mean?

a. It can be directly invoked from all files
b. It can only be directly invoked from the class and its children
c. It can only be directly invoked from the class it's defined in
d. It can only be directly invoked by all files within the package
e. None of the above

16. Which of the following code segments is equivalent to this loop:

```
for (int i = 0; i < 100; i++){
  if (i % 2 == 0) {
    System.out.println(i);
  }
}
```

a.
```
for (int i = 0; i < 100; i += 2){
  System.out.println(i);
}
```
b.
```
while(i < 100){
  System.out.println(i);
  i += 2;
}
```
c.
```
while(i < 100){
  if (i % 2 == 0) {
    System.out.println(i);
  }
  i++;
}
```

d. Both A and B

e. None of the above

17. What is the output of the following code when grade = 75

```
if (grade > 90)
  System.out.print("A ");
  System.out.print("Great Job ");

if (grade > 80)
  System.out.print("B ");
  System.out.print("Good Job ");

if (grade > 70)
  System.out.print("C ");
  System.out.print("Good Effort ");
```

a. C Good Effort
b. A Great Job B Good Job C Good Effort
c. B Good Job C Good Effort
d. Great Job Good Job C Good Effort
e. Great Job Good Job Good Effort

Questions 18-20 consider the following line of code:

```
double gpa = 4.0;
```

18. The part of the line of code to the left of the equal sign is referred to as what?

a. Initialization
b. Encapsulation
c. Definition
d. Declaration
e. Instantiation

19. The part of the line of code to the right of the equal sign is referred to as what?

a. Instantiation
b. Declaration
c. Initialization
d. Encapsulation
e. Construction

20. Which other data type in Java could you replace double with in order to maintain functionality ?

a. int
b. float
c. String
d. char
e. boolean

Questions 21-25 require you to reference the following code block

```
String s = "final stretch";
String t = "exam";
int c = 0;

for (int i = 0; i < t.length(); i++) {
    for (int j = 0; j < s.length(); j++) {
        if (s.substring(j,j+1) == t.substring(i,i+1))
            c++;
    }
}
System.out.println(c);
```

21. What is printed to the screen when this code executes?

a. 2
b. 4
c. 1
d. 0
e. 3

22. What would the output be if we replaced == with .equals(..) ?

a. 2
b. 4
c. 1
d. 0
e. 3

23. What would be the output if we swapped the s and t references in the loops and conditional?

a. 2
b. 4
c. 1
d. 0
e. 3

24. Same as (23) except we use .equals(..) rather than == ?

a. 3
b. 0
c. 1
d. 4
e. 2

25. Is the usage of == and .equals functionally equivalent with Strings?

a. Yes because both == and .equals check for equality on Strings
b. No because == compares references while .equals compares contents of the Strings
c. Yes because both == and .equals compare object references
d. No because .equals compares references while == compares contents
e. It depends on how the Strings are instantiated

26. Consider the following base-10 value: 337, what is its equivalent in base-2 (binary)?

a. 101010001
b. 101001111
c. 110001101
d. 101001101
e. 100101001

27. Consider the following method signature and select the option which is not a valid overloaded method

```
public int mystery(int x, int y)
```

a. public int mystery(int x)
b. public int mystery(String x, int y)
c. public double mystery(int x, int y)
d. public double mystery(int x)
e. All of the above are valid method overloads

28. Recall the structure of a byte, how many possible numbers can you be stored within a single byte?

a. 64
b. 8
c. 128
d. 256
e. 255

Questions 29 & 30 require you to reference the following class definition:

```
public class MysteryClass{

  private String s;
  private int x;

  public MysteryClass(String t, int y) {
     s = t;
     x = y;
  }

  public void mystery(int z) {
    x *= z;
  }

  public void mystery(double z) {
    x /= z;
  }
}
```

29. Consider the following code to be executed in the main method:

```
MysteryClass mc = new MysteryClass("King", 2025);
double val = 2;
mc.mystery(val);
```

What is the value of the attribute x after the above code executes

a. 1012.0
b. 4050
c. 4050.0
d. 1012.5
e. 1012

30. Considering that mystery has been properly overloaded this can lead you to the conclusion that a unique method signature consists of what?

a. Access Modifier, Method Name and Types Of Arguments
b. Method Name, Number Of Arguments, Types Of Arguments and Order Of Arguments
c. Method Name, Return Type and Number Of Arguments
d. Return Type, Access Modifier and Order Of Arguments
e. None of the above