Multiple Choice  70 points (35 items @ 2 point each) Select the letter in front of the most correct answer, and mark your answer scan sheet accordingly. Be sure and consider each response.

For questions 1-10, write the word "nothing" if no output is created. Assume the following variables have been declared:

```java
int n1, n2;
double d1, d2;
```

1. What is the exact output of the following code segment?
   ```java
   n1 = 3;
n2 = 8;
if (n1 <= n2) {
    System.out.print(n1 + " ");
    System.out.print(n2 + " ");
    System.out.println("end");
}
``` 
   a) 3 8 end 
b) 8 end 
c) 3 
   d) 8 
   e) nothing

2. What is the exact output of the following code segment?
   ```java
d1 = 13.4;
d2 = 9.801;
if (d1 == d2) {
    System.out.print("equal ");
} else if (d1 > d2) {
    System.out.print("greater ");
} else {
    System.out.print("less ");
    System.out.print("end");
}
``` 
   a) end 
b) greater 
c) greater end 
d) greater less end 
e) nothing

3. What is the exact output of the following code segment?
   ```java
   n1 = 16;
d1 = 3.2;
n2 = 0;
while (d1 < n1) {
    n2 = n2 + 1;
d1 = d1 + 5;
}
System.out.println (n2 + " " + d1);
``` 
   a) 0 3.2 
b) 1 13.2 
c) 2 18.2 
d) 3 18.2 
e) nothing

4. What is the exact output of the following code segment?
   ```java
   if (23 <= 5)
    if (4 >= 2)
      System.out.print("middle ");
    else
      System.out.print("not ");
   System.out.print("end");
``` 
   a) end 
b) not end 
c) middle end 
d) middle not end 
e) nothing
5. What is the exact output of the following code segment?
   ```java
   if (3 <= 15)
       if (4 >= 2)
           System.out.print("happy ");
       else System.out.print("sad ");
   System.out.println("end");
   ```

   a) happy  b) sad  c) sad end  d) happy end  e) nothing

6. What is the exact output of the following code segment?
   ```java
   if (13 <= 5)
       if (4 <= 2)
           System.out.print("red ");
       else {
           System.out.print("blue ");
           System.out.print("end");
       }
   ```

   a) red  b) blue end  c) red end  d) red blue end  e) nothing

7. What is the exact output of the following code segment?
   ```java
   if (13 <= 5) {
       if (4 <= 2)
           System.out.print("red ");
       else
           System.out.print("blue ");
       System.out.print("end");
   }
   ```

   a) end  b) blue end  c) red end  d) red blue end  e) nothing

8. What is the exact output of the following code segment?
   ```java
   n1 = 3;
   while (n1 < 8) {
       if (n1 % 2 == 0)
           System.out.print(n1 + " ");
       n1 = n1 + 3;
       if (n1 % 3 == 0)
           System.out.print(n1 + " ");
       n2 = n1;
       while (n2 < 6) {
           System.out.print(n2);
           n2 = n2 + 1;
       }
   }
   ```

   a) 3 6 9  b) 3 3 9  c) 6 6 9  d) 3 4 5  e) nothing

9. What is the exact output of the following code segment?
   ```java
   n2 = 0;
   for (n1 = 24; n1 <= 30; n1 = n1 + 2)
       n2 = n2 + n1;
   System.out.println(n2);
   ```

   a) 78  b) 108  c) 24 50 78  d) 24 50 78 108  e) nothing
10. What is the exact output of the following code segment?

```java
char ch;
String s1 = new String("this is it");
n1 = 0;
n2 = 0;
do {
    if (s1.charAt(n1) == 'i')
        n2 = n2 + 2;
    else
        n2++;
    n1 = n1 + 1;
} while (n1 < s1.length());
System.out.println(n2);
```

a) 6  b) 10  c) 11  d) 13  e) nothing

11. What is the exact output of the following code segment?

```java
int num = 6;
while (num < 16) {
    switch (num % 4) {
    case 0: System.out.print("multiple ");
        break;
    case 1: System.out.print("one ");
        break;
    case 2: System.out.print("two ");
        break;
    case 3: System.out.print("three ");
        break;
    }
    num += 3;
}
```

a) one multiple one two three  b) one multiple one three two  c) two three one multiple three
d) two one multiple three  e) none of the above

12. Which of the following is a correct interface?

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<td>e) none of the above</td>
</tr>
</tbody>
</table>

13. Given the following code segment: where A is an interface, B is a concrete class with a default constructor that implements A.

```java
interface A{
}
class B implements A{
}
```

Which of the following is correct?

a) A a = new A();
b) A a = new B();
c) B b = new A();
d) B b = new B();
e) b and d
14. What is the representation of the third element in an array called a?
   a) a[2]  b) a(2)  c) a[3]  d) a(3)  e) none of the above

15. Analyze the following code.
   public class Test {
     public static void main(String[] args) {
       int[] x = new int[3];
       System.out.println("x[0] is " + x[0]);
     }
   }
   a) The program has a compiler error because the size of the array wasn't specified when declaring the array.
   b) The program has a runtime error because the array elements are not initialized.
   c) The program runs fine and displays x[0] is 0.
   d) The program has a runtime error because the array element x[0] is not defined.
   e) none of the above

16. Which of the following statements is valid?
   a) int i = new int(30);
   b) int[] i = {3, 4, 3, 2};
   c) double d[30] = new double[];
   d) char[] c = new char();
   e) char[] c = new char[4]{'a', 'b', 'c', 'd'};

17. What is the output of the following code?
   public class Test17 {
     public static void main(String[] args) {
       int[] x = {1, 2, 3, 4};
       int[] y = x;
       x = new int[2];
       for (int i = 0; i < y.length; i++)
         System.out.print(y[i] + " ");
     }
   }
   a) 1 2 3 4
   b) 0 0
   c) 0 0 3 4
   d) 0 0 0 0
   e) none of the above

18. Assume double[][] x = new double[4][5], what are x.length and x[2].length?
   a) 4 and 4  b) 4 and 5  c) 5 and 4  d) 5 and 5  e) none of the above

19. What is wrong in the following code?
   class TempClass {
     int i;
     public void TempClass(int j) {
       int i = j;
     }
   }
   public class C {
     public static void main(String[] args) {
       TempClass temp = new TempClass(2);
     }
   }
   a) The program has a compilation error because TempClass does not have a default constructor.
   b) The program has a compilation error because TempClass does not have a constructor with an int argument.
   c) The program compiles fine, but it does not run because class C is public.
   d) a and b.
   e) None of the above.
20. Variables that are shared by every instances of a class are ________________ variables.
   a) public    b) private    c) protected    d) static    e) instance

21. To declare a constant MAX_LENGTH as a static variable with value 99.98, you write
   a) final static MAX_LENGTH = 99.98;
   b) final static double MAX_LENGTH = 99.98;
   c) static double MAX_LENGTH = 99.98;
   d) final double MAX_LENGTH = 99.98;
   e) final double static MAX_LENGTH = 99.98;

22. To set a FlowLayout in panel jp, you can use the method __________.
   a) jp.setLayout(new FlowLayout(FlowLayout.center));
   b) jp.setLayout(new FlowLayout(FlowLayout.CENTER));
   c) jp.setLayout(new FlowLayout());
   d) jp.setLayout(FlowLayout());
   e) a or b

23. What is the output of the following code?

   ```java
   public class Test23 {
       public static void main(String[] args) {
           int n = 2;
           xMethod(n);

           System.out.println("n is " + n);
       }

       void xMethod(int n) {
           n++;
       }
   }
   ```

   a) The code has a compiler error because xMethod does not return a value.
   b) The code has a compiler error because xMethod is not declared static.
   c) The code prints n is 1.
   d) The code prints n is 2.
   e) The code prints n is 3.

24. What does the first `System.out.println` in the main method print?

   ```java
   public class Foo {
       static int i = 0;
       static int j = 0;

       public static void main(String[] args) {
           int i = 2;

           int j = 3;
           System.out.print("i + j = " + (i + j));

           System.out.println("; j = " + j);
       }
   }
   ```

   a) i+j = 5; j = 0
   b) i+j = 5; j = 3
   c) i+j = 0; j = 0
   d) i+j = 0; j = 3
   e) compiler error
25. The default layout out of a contentPane in a JFrame is __________.
   a) FlowLayout  
   b) GridLayout  
   c) BorderLayout  
   d) GridBagLayout  
   e) TabbedLayout

26. Java arrays can store primitive types and Strings, but cannot store any other type of Object other than Strings.
   a) True  
   b) False

27. What is the printout of the following switch statement?

   ```java
   char ch = 'b';
   switch (ch) {
       case 'a':
           System.out.print(ch);
       case 'b':
           System.out.print(ch);
       case 'c':
           System.out.print(ch);
       case 'd':
           System.out.print(ch);
   }
   ```
   a) abcd  
   b) bcd  
   c) bbb  
   d) bb  
   e) b

28. What is the output of the following code?

   ```java
   class Test29 {
       public static void main(String[] args) {
           int x = 3;
           int y = 0;
           switch (x + 3) {
               case 6: y = 0;
               case 7: y = 1;
               default: y += 1;
           }
           System.out.print (y);
       }
   }
   ```
   a) 1  
   b) 2  
   c) 3  
   d) 4  
   e) 9

29. What is y after the following statement is executed?

   ```java
   int x = 0;
   int y = (x > 0) ? 10 : -10;
   ```
   a) 0  
   b) 10  
   c) 20  
   d) -10  
   e) Illegal expression

30. The following loop is syntactically correct.

   ```java
   for (; ; );
   ```
   a) True  
   b) False
31. What is the printout of the following switch statement?

```java
char ch = 'a';

switch (ch) {
    case 'a':
    case 'A':
        System.out.print(ch);
        break;
    case 'b':
    case 'B':
        System.out.print(ch);
        break;
    case 'c':
    case 'C':
        System.out.print(ch);
        break;
    case 'd':
    case 'D':
        System.out.print(ch);
}
```

a) ab  b) aa  c) a  d) abcd  e) compiler error

32. The following two statements result in the same value in sum

```java
int sum = 0;
for (int i = 0; i < 3; i++) {
    sum += i;
}
```

```java
int sum = 0;
for (int i = 0; i < 3; i = i+1) {
    sum += i;
}
```

a) True  b) False

33. In order to implement Comparable in a class, what method(s) must be defined in that class?
   a) equals
   b) compares
   c) both lessThan and greaterThan
   d) compareTo
   e) both compares and equals

34. Aggregation is
   a) described as a has-a relationship
   b) using an object reference as a local variable
   c) a form of software documentation
   d) all of the above
   e) none of the above

35. When a class implements an interface, what must it do?
   a) it must redefine each constant from the interface.
   b) it must declare and provide a method body for each method in the interface.
   c) it must declare a variable for each constant in the interface.
   d) it must include a private method for each method in the interface.
   e) none of the above
**Short Answer 10 points (4 + 3 + 3 points each)**

What is the output of the following code fragments? Place your answer in the space provided.

<table>
<thead>
<tr>
<th>Code Fragment</th>
<th>Output</th>
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<tbody>
<tr>
<td>36)</td>
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</table>
```java
public class Short1 {
    public static void main(String[] args) {
        int[] list = {1, 2, 3, 4};
        int[] newList = new int[list.length];
        for (int i = 0; i < list.length; i++)
            newList[i] = list[list.length - 1 - i];
        for (int i = 0; i < newList.length; i++)
            System.out.print(newList[i] + " ");
    }
}
```
| 4 3 2 1 |
| 37) | 
```java
public class Short2 {
    public static void main(String argv[]) {
        MyClass m1 = new MyClass();
        m1.iMyVal = 0;
        MyClass m2 = new MyClass();
        m2.iMyVal = 1;
        MyClass m3 = new MyClass();
        m3.iMyVal = 99;
        System.out.println("m1.iMyVal = "+m1.iMyVal);
        System.out.println("m2.iMyVal = "+m2.iMyVal);
        System.out.println("m3.iMyVal = "+m3.iMyVal);
    }
}
```
| m1.iMyVal = 99  
m2.iMyVal = 99  
m3.iMyVal = 99 |
| 38) | 
```java
class MyClass{
    public static int iMyVal = 0;
}
```
| 
```java
class Short3{
    public static void main (String args[]){
        int result = 0;
        int j = 7;
        if (3 > 2) {
            result = 1;
            if (j > 4)
                result = 6;
            else
                result = 5;
        }
        System.out.println ("Result = " + result);
        String i = (j<=6)? "lesser": "greater";
        System.out.println ("i = " + i);
        i = (j<=8)? "lesser": "greater";
        System.out.println ("i = " + i);
    }
}
```
| Result = 6  
i = greater  
i = lesser |
39) Problem (20 points) In the following driver program we create an array of 3 books and print out the details of each using a for loop. Then using the method largest we determine the book with the most number of pages. Fill in the missing parts (20 blanks @ 1 point each) of the following Java program. Use the SAMPLE OUTPUT to help determine your answers. Place your answers in spaces provided.

```java
class DriverProgram {
    static private Book[] _library = new Book[3];

    public static void main (String[] args)
    {
        _library[0] = new Book("William", "Strunk Jr.", "The Elements of Style", 105);
        _library[1] = new Book("Thomas", "Friedman", "The World Is Flat", 496);

        for (int i = 0; i < _library.length; i++)
            System.out.println(_library[i].toString());

        System.out.println("\n\nBook with most number of pages = ");
        System.out.println(largest( _library[0], _library[1], _library[2]) );
    }

    static Comparable largest (Comparable b1, Comparable b2, Comparable b3 ){
        Comparable largest=null;
        if (b1.compareTo(b2)>0 && b1.compareTo(b3)>0)
            largest = b1;
        if (b2.compareTo(b3)>0 && b2.compareTo(b1)>0)
            largest = b2;
        if (b3.compareTo(b2)>0 && b3.compareTo(b1)>0)
            largest = b3;
        return largest;
    }

    class Book implements Comparable {
        private String authorFirst, authorLast, title;
        private int pages;

        public Book (String authorF, String authorL, String title, int pages){
            authorFirst = authorF;
            authorLast = authorL;
            this.title = title;
            this.pages = pages;
        }

        public String toString(){
            String result = "Author: " + authorFirst + " \n" + authorLast + " \nTitle: " + this.title + " \nPages: " + pages;
            return result;
        }

        public int compareTo (Object obj ){
            Book obj2 = (Book) obj;
            Integer pagesObj1 = new Integer (pages);
            Integer pagesObj2 = new Integer (obj2.pages);
            return (pagesObj1.compareTo(pagesObj2));
        }
    }
}
```

SAMPLE OUTPUT

Author: William Strunk Jr. Title: The Elements of Style Pages: 105
Author: Thomas Friedman Title: The World Is Flat Pages: 496
Author: Dan Brown Title: Angels & Demon Pages: 608

Book with most number of pages =
Author: Dan Brown Title: Angels & Demon Pages: 608