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MODULE 3 (4.3) :- PRACTICE PROGRAMS

PROBLEM 1 :-

```java
1  package oracle;
2
3  public class Linear {
4      public static double factorial(double n) {
5          if (n <= 1) {
6              return 1;
7          }
8          return n * factorial(n - 1);
9      }
10
11     public static void main(String[] args) {
12         double d = 5.0;
13         double result = factorial(d);
14         System.out.println("Factorial of [" + d + "] is [" + result + "]");
15     }
16
17 }
18
```

Output:

```
Factorial of [5.0] is [120.0]
```

PROBLEM 2 :-

```java
1  package oracle;
2
3  public class NonLinear {
4      public static double fibonacci(double n) {
5          if (n < 2) {
6              return n;
7          }
8          return fibonacci(n - 1) + fibonacci(n - 2);
9      }
10
11     public static void main(String[] args) {
12         double d;
13
14         if (args.length > 0) {
15             d = Double.parseDouble(args[0]);
16         } else {
17             d = 5.0;
18         }
19
20         for (int i = 0; i <= (int)d; i++) {
21             double fibValue = fibonacci(i);
22             System.out.println("Fibonacci index [" + i + ".0] value [" + fibValue + ".0]");
23         }
24     }
25
26
27 }
28
```

Output:

```
Fibonacci index [1.0] value [1.0.0]
Fibonacci index [2.0] value [1.0.0]
Fibonacci index [3.0] value [2.0.0]
Fibonacci index [4.0] value [3.0.0]
Fibonacci index [5.0] value [5.0.0]
```

PROBLEM 3 :-

```java
 1  package oracle;
 2
 3  public class Factorial {
 4      public static double factorial(double d) {
 5          if (d <= 1) {
 6              System.out.println("factorial(" + d + ") = 1");
 7              return 1;
 8          } else {
 9              double result = d * factorial(d - 1);
10              System.out.println("factorial(" + d + ") = " + d + " * factorial(" + (d - 1) + ") = " + result)
11              return result;
12          }
13      }
14
15      public static void main(String[] args) {
16          double number = 7;
17          double result = factorial(number);
18          System.out.println("The factorial of " + number + " is: " + result);
19      }
20
21  }
```

Output:

```
factorial(1.0) = 1
factorial(2.0) = 2.0 * factorial(1.0) = 2.0
factorial(3.0) = 3.0 * factorial(2.0) = 6.0
factorial(4.0) = 4.0 * factorial(3.0) = 24.0
factorial(5.0) = 5.0 * factorial(4.0) = 120.0
factorial(6.0) = 6.0 * factorial(5.0) = 720.0
factorial(7.0) = 7.0 * factorial(6.0) = 5040.0
The factorial of 7.0 is: 5040.0
```