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Module 3: 4.3 practice programs

Problem 1:

```
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 }
22
```

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
```