Fakultas Ilmu Komputer, Universitas Indonesia
CSGE601021 Foundations of Programming 2
Worksheet 04
Encapsulation, Inheritance, Polymorphism

1. Find the output of this program.

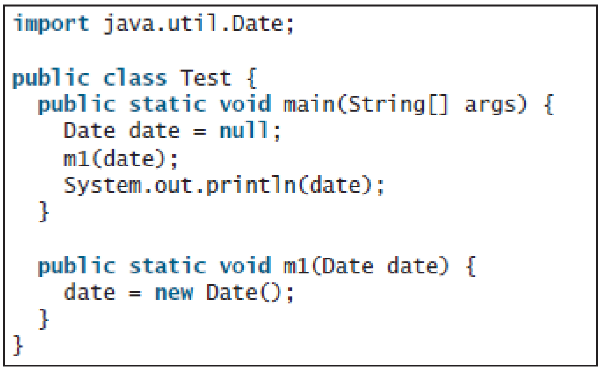
```
class Point {
  private int x, y;
  Point() { this(0,0); }
  Point(int x, int y) { this.x = x; this.y = y; }
  void move(int dx, int dy) { x += dx; y += dy; }
  public String toString() { return "Titik(" + x + "," + y + ")"; }
}
public class Problem1 {
  public static void main(String[] args) {
    Point p = new Point(100, 200);
    int[] a = new int[6];
    int d = 80;
    System.out.println("p: " + p);       //Print:………………………………
    System.out.println("a[3]: " + a[3]); //Print:………………………………
    m(p, d, a);
    System.out.println("p: " + p);       //Print:………………………………
    System.out.println("d: " + d);       //Print:………………………………
    System.out.println("a[3]: " + a[3]); //Print:………………………………
  }
  public static void m(Point pp, int dd, int[] aa) {
    pp.move(dd, dd);  dd = 115;  aa[3] = 27;
  }
}
```

```
Expected output:
1 2 3 4
1 3 2 4
2 6 4 8
```

```
2. //Fill in the blanks for using method chaining

public class Chaining {
   private int[] ar;
   public Chaining() {
     ar = new int[]{1,2,3,4};
   }
   public …………………… swap(int i, int j) {
     int temp = ar[i]; ar[i] = ar[j]; ar[j] = temp; ……………………;
   }
   public …………………… twice() {
     for (int i = 0; i < ar.length; i++) ar[i] *= 2;
     ……………………………………;
   }
   public ……………………………… cetak() { //prints the array
     for (int i=0; i < ar.length; i++) {
        System.out.print(ar[i] + " ");
     }
     System.out.println();
     ………………………………………;
   }
   public static void main(String[] args) {
     Chaining ob = new Chaining();
     ob.cetak().swap(1,2).cetak().twice().cetak();
   }
}
```

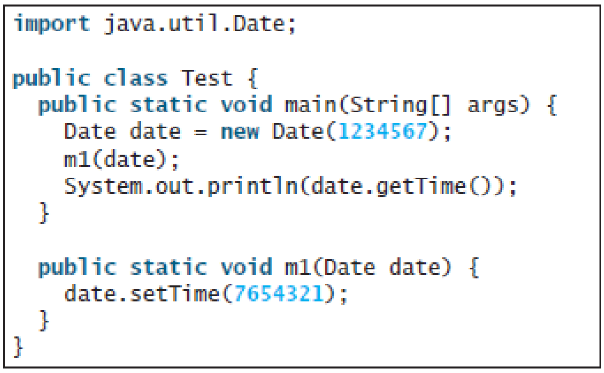
3. Find the output of these programs.



```
import java.util.Date;

public class Test {
  public static void main(String[] args) {
    Date date = null;
    m1(date);
    System.out.println(date);
  }

  public static void m1(Date date) {
    date = new Date();
  }
}
```

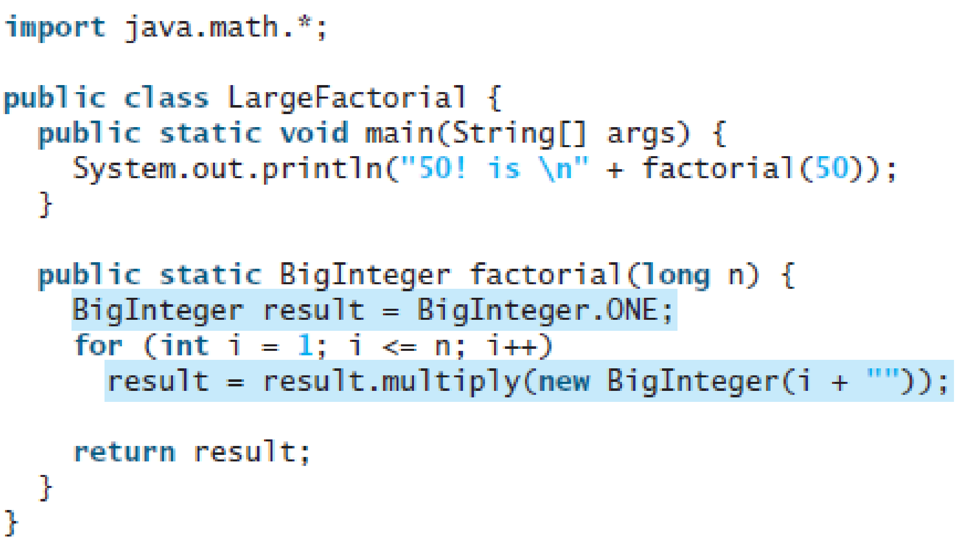


```
import java.util.Date;

public class Test {
  public static void main(String[] args) {
    Date date = new Date(1234567);
    m1(date);
    System.out.println(date.getTime());
  }

  public static void m1(Date date) {
    date.setTime(7654321);
  }
}
```

4. Define the recursive version of the method factorial with BigInteger.



```
import java.math.*;

public class LargeFactorial {
  public static void main(String[] args) {
    System.out.println("50! is \n" + factorial(50));
  }

  public static BigInteger factorial(long n) {
    BigInteger result = BigInteger.ONE;
    for (int i = 1; i <= n; i++)
      result = result.multiply(new BigInteger(i + ""));

    return result;
  }
}
```

5.

Find the output printed by the following Java program which consists of 4 files.
These four files must be saved in a folder (directory), named ....

```
//File: AboutInterface.java
package abc;

public class AboutInterface {

    public static void main(String[] args) {
        Speakable obj;

        obj = new Dog("Cute"); //print:...................

        System.out.println(obj); //print:..................

        obj.speak(); //print:.......................

        obj = new Cat("Lazy"); //print:.......................

        System.out.println(obj); //print:......................

        obj.speak(); //print:.............................

        Speakable[] arr = new Speakable[3];
        arr[0] = obj;
        arr[1] = obj;
        arr[2] = new Dog("Adorable"); //print: ...................

        for (Speakable s: arr) s.speak(); //print:................

    }

}
```

```
//File: Speakable.java
package abc;

public interface Speakable {
    void speak();
}
```

```
//File: Dog.java
package abc;

public class Dog implements Speakable {
   private String name;

   public Dog(String name)  {
      this.name = name; System.out.println("I am a dog.");
   }

   public void speak() {
     System.out.println("Woof! Woof!");
   }

   public String toString(){
      return "Dog:  " + name;
   }
}
```

```
//File: Cat.java
package abc;

public class Cat implements Speakable {
   private String name;

   public Cat(String name) {
      this.name = name; System.out.println("I am a cat.");
   }

   public void speak() {
     System.out.println("Meow! Meow!");
   }

   public String toString() {
      return "Cat:  " + name;
   }
}
```