```java
/*
 * To change this license header, choose License Headers in Project Properties.
 * To change this template file, choose Tools | Templates
 * and open the template in the editor.
 */
package ex5;

import java.util.Collections;
import java.util.Comparator;
import java.util.Iterator;
import java.util.LinkedList;
import java.util.List;

/**
 *
 * @author Van
 */
public class AlgorithmsDemo {

    public static void main(String args[]) {

        // Create and initialize linked list
        List<Integer> list = new LinkedList<>();
        list.add(0);
        list.add(-8);
        list.add(20);
        list.add(-20);
        list.add(8);

        // Sort ascendingly
        Collections.sort(list);
        System.out.print("List sorted: ");
        for (Integer i : list) {
            System.out.print(i + " ");
        }
        System.out.println();

        // Create a reverse order comparator
        Comparator<Integer> r = Collections.reverseOrder();
        // Sort list by using the comparator
        Collections.sort(list, r);
        System.out.print("List sorted in reverse: ");
        for (Integer i : list) {
            System.out.print(i + " ");
        }
        System.out.println();

        // display randomized list
        Collections.shuffle(list);
        Iterator<Integer> li = list.iterator();
        System.out.print("List shuffled: ");
        while (li.hasNext()) {
            System.out.print(li.next() + " ");
        }
        System.out.println();

        // show minimum and maximum
        System.out.println("Minimum: " + Collections.min(list));
        System.out.println("Maximum: " + Collections.max(list));
    }
}
```



2021/12/10 上午2:35 AlgorithmsDemo.java

```java
/*
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 */
package ex5;

import java.util.ArrayList;
import java.util.Iterator;
import java.util.List;

/**
 *
 * @author Van
 */
public class ArrayListDemo {

    public static void main(String args[]) {

        // create an empty array list1 with an initial capacity
        List<Integer> list1 = new ArrayList<>(5);

        // use add() method to add elements in the list
        list1.add(12);
        list1.add(20);
        list1.add(45);

        // let us print all the elements available in list1
        System.out.println("Printing list1:");
        for (Integer number : list1) {
            System.out.println("Number = " + number);
        }

        // create an empty array list2 with an initial capacity
        List<Integer> list2 = new ArrayList<>(5);

        // use add() method to add elements in list2
        list2.add(25);
        list2.add(30);
        list2.add(31);
        list2.add(35);

        // let us print all the elements available in list2
        System.out.println("Printing list2:");
        Iterator<Integer> it = list2.iterator();
        while(it.hasNext())
            System.out.println("Number = " + it.next());


        // inserting all elements, list2 will get printed after list1
        list1.addAll(list2);

        System.out.println("Printing all the elements");
        // let us print all the elements available in list1
        int len = list1.size();
        for (int i=0; i<len; i++) {
            System.out.println("Number = " + list1.get(i));
        }
    }
```





```java
}

```

```java
/*
 * To change this template, choose Tools | Templates
 * and open the template in the editor.
 */
package ex5;

/**
 *
 * @author vanting
 */
public class Box {

    private Object object;

    public void set(Object object) {
        this.object = object;
    }

    public Object get() {
        return object;
    }
}

```





```java
/*
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 * and open the template in the editor.
 */
package ex5;

import java.util.ArrayList;
import java.util.Collections;
import java.util.Comparator;
import java.util.List;

/**
 *
 * @author Van
 */
class Dog implements Comparable<Dog> {

    private final String name;
    private final int age;

    Dog(String n, int a) {
        name = n;
        age = a;
    }

    public String getDogName() {
        return name;
    }

    public int getDogAge() {
        return age;
    }

    // Overriding the compareTo method
    @Override
    public int compareTo(Dog d) {
        return (this.name).compareTo(d.name);
    }

    public static void main(String args[]) {

        // Takes a list o Dog objects
        List<Dog> list = new ArrayList<>();

        list.add(new Dog("Shaggy", 3));
        list.add(new Dog("Lacy", 2));
        list.add(new Dog("Roger", 10));
        list.add(new Dog("Tommy", 4));
        list.add(new Dog("Tammy", 1));
        Collections.sort(list);             // Sorts the array list

        //printing the sorted list of names
        System.out.println("Sort by natural order (Comparable Interface):");
        for (Dog dog : list) {
            System.out.print(dog.getDogName() + ", ");
        }

        // Sorts the array list using comparator
```

```
60          Collections.sort(list, new Comparator<Dog>() {
61              // Overriding the compare method to sort the age
62              @Override
63              public int compare(Dog d1, Dog d2) {
64                  return d1.age - d2.age;
65              }
66          });
67          System.out.println("\n");
68
69          //printing the sorted list of ages
70          System.out.println("Sort by age (Comparator Interface):");
71          for (Dog dog : list) {
72              System.out.print(dog.getDogName() + ":" + dog.getDogAge() + ", ");
73          }
74
75      }
76  }
77
```





```
1  /*
2   * To change this template, choose Tools | Templates
3   * and open the template in the editor.
4   */
5  package ex5;
6
7  /**
8   *
9   * @author vanting
10  */
11 public class GBox<T> {
12
13      // T stands for "Type"
14
15      private T t;
16
17      public void set(T t) {
18          this.t = t;
19      }
20
21      public T get() {
22          return t;
23      }
24
25 }
26
```

```java
/*
 * To change this license header, choose License Headers in Project Properties.
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 */
package ex5;

import java.util.HashMap;
import java.util.Map;

/**
 *
 * @author Van
 */
public class HashMapDemo {

    public static void main(String args[]) {
        // create hash map
        Map<Integer, String> map = new HashMap<>();

        // populate hash map
        map.put(1, "Java");
        map.put(2, "teacher");
        map.put(3, "is best");

        // checking collection view of the map
        System.out.println("Key set values are: " + map.keySet());
        System.out.println("Collection view is: " + map.values());

        // get value of key 3
        String val = map.get(3);
        System.out.println("Value for key 3 is: " + val);

        // put new values at key 3
        System.out.println("Put new values at key 3");
        map.put(3, "is great");
        System.out.println("Map value after change: " + map);
    }
}
```





```java
/*
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 */
package ex5;

import java.util.HashSet;
import java.util.Set;

/**
 *
 * @author Van
 */
public class HashSetDemo {

    public static void main(String args[]) {
        // create hash set
        Set<String> set = new HashSet<>();

        // populate hash set
        set.add("Learning");
        set.add("Easy");
        set.add("Simply");

        // check the existence of element
        boolean exist = set.contains("Easy");
        System.out.println("Hash set values: " + set);
        System.out.println("Is the element 'Easy' exists: " + exist);
        System.out.println("");

        // remove "Easy" from set
        boolean isremoved = set.remove("Easy");
        System.out.println("Can remove?: " + isremoved);
        System.out.println("Values after remove: " + set);
        System.out.println("");

        // clear set values
        set.clear();
        System.out.println("Hash set values after clear: " + set);
    }
}
```

```java
/*
 * To change this template, choose Tools | Templates
 * and open the template in the editor.
 */
package ex5;

/**
 *
 * @author vanting
 * @param <K>
 * @param <V>
 */
public class OrderedPair<K, V> implements Pair<K, V> {

    private final K key;
    private final V value;

    public OrderedPair(K key, V value) {
        this.key = key;
        this.value = value;
    }

    @Override
    public K getKey() {
        return key;
    }

    @Override
    public V getValue() {
        return value;
    }

    @Override
    public String toString() {
        return "OrderedPair [key=" + key + ", value=" + value + "]";
    }

    public static void main(String[] args) {
        Pair<String, Integer> p1 = new OrderedPair<>("Even", 8);
        Pair<String, String> p2 = new OrderedPair<>("hello", "world");
        Pair<String, GBox<Integer>> p3 = new OrderedPair<>("hello", new GBox<Integer>
());

        System.out.println(p1);
        System.out.println(p2);
        System.out.println(p3);
    }

}

```





```java
/*
 * To change this template, choose Tools | Templates
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 */
package ex5;

/**
 *
 * @author vanting
 * @param <K>
 * @param <V>
 */
public interface Pair<K, V> {

    public K getKey();

    public V getValue();
}

```

```java
/*
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 * and open the template in the editor.
 */
package ex5;

import java.util.Arrays;
import java.util.List;

/**
 *
 * @author vanting
 */
public class UnboundedWildcards {

    public static void main(String[] args) {
        List<Integer> li = Arrays.asList(1, 2, 3);
        List<String> ls = Arrays.asList("one", "two", "three");
        printList(li);
        UnboundedWildcards.<String>printList2(ls);

        // printList2(ls);
        // printList3(li);
    }

    public static void printList3(List<Object> list) {
        for (Object elem : list) {
            System.out.println(elem + " ");
        }
        System.out.println();
    }

    // this is a generic method
    public static <T> void printList2(List<T> list) {
        for (Object elem : list) {
            System.out.print(elem + " ");
        }
        System.out.println();
    }

    // this is not a generic method
    public static void printList(List<?> list) {
        for (Object elem : list) {
            System.out.print(elem + " ");
        }
        System.out.println();
    }
}

```





```java
/*
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 */
package ex5;

/**
 *
 * @author vanting
 */
public class Util {

    public static void main(String[] args) {
        OrderedPair<Integer, String> p1 = new OrderedPair<>(1, "apple");
        OrderedPair<Integer, String> p2 = new OrderedPair<>(2, "pear");
        OrderedPair<Integer, String> p3 = new OrderedPair<>(2, "pear");

        boolean same1 = Util.compare(p1, p2);
        boolean same2 = Util.compare(p2, p3);

        System.out.println((same1) ? "They are the same" : "They are not the same");
        System.out.println((same2) ? "They are the same" : "They are not the same");

    }

    // generic method
    public static <K, V> boolean compare(OrderedPair<K, V> p1, OrderedPair<K, V> p2)
{
        return p1.getKey().equals(p2.getKey()) &&
p1.getValue().equals(p2.getValue());
    }

}

```