**Department of Computing Sciences**

**SUNY Brockport**

**CSC 205 (Fundamentals of Data Structures)**

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**Lab Exercise 4**

**package** TestingAndComplexity;

**public** **class** IntSortSearchTester

{

**public** **static** **void** linearSearchTester()

{

System.***out***.println("Linear Search Tester:");

String test = "Test 4.";

**int**[] a = {1};

System.***out***.println(test+"a: "+(IntSortSearch.*linearSearch*(a, 1) ==-1?**false**:**true**));

System.***out***.println(test+"b: "+(IntSortSearch.*linearSearch*(a, 0) ==-1?**false**:**true**));

**int** []b = {1,2};

System.***out***.println(test+"c: "+(IntSortSearch.*linearSearch*(b, 1) ==-1?**false**:**true**));

System.***out***.println(test+"d: "+(IntSortSearch.*linearSearch*(b, 0) ==-1?**false**:**true**));

**int** []c = {3,4,5};

System.***out***.println(test+"e: "+(IntSortSearch.*linearSearch*(c, 3) ==-1?**false**:**true**));

System.***out***.println(test+"f: "+(IntSortSearch.*linearSearch*(c, 5) ==-1?**false**:**true**));

System.***out***.println(test+"g: "+(IntSortSearch.*linearSearch*(c, 4) ==-1?**false**:**true**));

System.***out***.println(test+"h: "+(IntSortSearch.*linearSearch*(c, 1) ==-1?**false**:**true**));

System.***out***.println();

}

**public** **static** **void** binarySearchTester()

{

System.***out***.println("Binary Search Tester:");

String test = "Test 4.";

**int**[] a = {1};

System.***out***.println(test+"a: "+(IntSortSearch.*binarySearch*(a, 1) ==-1?**false**:**true**));

System.***out***.println(test+"b: "+(IntSortSearch.*binarySearch*(a, 0) ==-1?**false**:**true**));

**int** []b = {1,2};

System.***out***.println(test+"c: "+(IntSortSearch.*binarySearch*(b, 1) ==-1?**false**:**true**));

System.***out***.println(test+"d: "+(IntSortSearch.*binarySearch*(b, 0) ==-1?**false**:**true**));

**int** []c = {3,4,5};

System.***out***.println(test+"e: "+(IntSortSearch.*binarySearch*(c, 3) ==-1?**false**:**true**));

System.***out***.println(test+"f: "+(IntSortSearch.*binarySearch*(c, 5) ==-1?**false**:**true**));

System.***out***.println(test+"g: "+(IntSortSearch.*binarySearch*(c, 4) ==-1?**false**:**true**));

System.***out***.println(test+"h: "+(IntSortSearch.*binarySearch*(c, 1) ==-1?**false**:**true**));

System.***out***.println();

}

**public** **static** **void** sortTester()

{

System.***out***.println("Selection Sort Tester:");

**int** a[] = {1};

System.***out***.print("Before: ");

**for** (**int** i : a) {

System.***out***.print(i+" ");

}

System.***out***.println();

IntSortSearch.*selectionSort*(a);

System.***out***.print("After: ");

**for** (**int** i : a) {

System.***out***.print(i+" ");

}

System.***out***.println();

**int** b[] = {5,4};

System.***out***.print("Before: ");

**for** (**int** i : b) {

System.***out***.print(i+" ");

}

System.***out***.println();

IntSortSearch.*selectionSort*(b);

System.***out***.print("After: ");

**for** (**int** i : b) {

System.***out***.print(i+" ");

}

System.***out***.println();

**int** c[] = {1,2,3};

System.***out***.print("Before: ");

**for** (**int** i : c) {

System.***out***.print(i+" ");

}

System.***out***.println();

IntSortSearch.*selectionSort*(c);

System.***out***.print("After: ");

**for** (**int** i : c) {

System.***out***.print(i+" ");

}

System.***out***.println();

**int** d[] = {6,5,4};

System.***out***.print("Before: ");

**for** (**int** i : d) {

System.***out***.print(i+" ");

}

System.***out***.println();

IntSortSearch.*selectionSort*(d);

System.***out***.print("After: ");

**for** (**int** i : d) {

System.***out***.print(i+" ");

}

System.***out***.println();

**int** e[] = {-3,-1,-2};

System.***out***.print("Before: ");

**for** (**int** i : e) {

System.***out***.print(i+" ");

}

System.***out***.println();

IntSortSearch.*selectionSort*(e);

System.***out***.print("After: ");

**for** (**int** i : e) {

System.***out***.print(i+" ");

}

System.***out***.println();

**int** []f = {1,0,-1};

System.***out***.print("Before: ");

**for** (**int** i : f) {

System.***out***.print(i+" ");

}

System.***out***.println();

IntSortSearch.*selectionSort*(f);

System.***out***.print("After: ");

**for** (**int** i : f) {

System.***out***.print(i+" ");

}

System.***out***.println();

**int** g[] = {5,5,5};

System.***out***.print("Before: ");

**for** (**int** i : g) {

System.***out***.print(i+" ");

}

System.***out***.println();

IntSortSearch.*selectionSort*(g);

System.***out***.print("After: ");

**for** (**int** i : g) {

System.***out***.print(i+" ");

}

System.***out***.println();

}

**public** **static** **void** main(String args[])

{

*linearSearchTester*();

*binarySearchTester*();

*sortTester*();

}

}

**OutPut:**

Testing Linear Search:

Num Comps = 1

Test 4.a: true

Num Comps = 1

Test 4.b: false

Num Comps = 1

Test 4.c: true

Num Comps = 2

Test 4.d: false

Num Comps = 1

Test 4.e: true

Num Comps = 3

Test 4.f: true

Num Comps = 2

Test 4.g: true

Num Comps = 3

Test 4.h: false

Testing Binary Search:

Num Comps = 1

Test 4.a: true

Num Comps = 1

Test 4.b: false

Num Comps = 1

Test 4.c: true

Num Comps = 1

Test 4.d: false

Num Comps = 2

Test 4.e: true

Num Comps = 2

Test 4.f: true

Num Comps = 1

Test 4.g: true

Num Comps = 2

Test 4.h: false

Testing Selection Sort:

Before: 1

Num Comps = 0

After: 1

Before: 5 4

Num Comps = 2

After: 4 5

Before: 1 2 3

Num Comps = 5

After: 1 2 3

Before: 6 5 4

Num Comps = 5

After: 4 5 6

Before: -3 -1 -2

Num Comps = 5

After: -3 -2 -1

Before: 1 0 -1

Num Comps = 5

After: -1 0 1

Before: 5 5 5

Num Comps = 5

After: 5 5 5