1.4.6

a)
```
int sum = 0;
for (int k = n; n > 0; k /= 2)
    for (int i = 0; i < k; i++)
        sum++;
```

if n = 4

4 2 1 > 7

2N-1

n = 8

8 4 2 1 > 15

2N-1

n = 10

10 5 2 1 > 18

2N-2

n = 11

11 5 2 1 > 19

2N-3

n = 12

12 6 3 1 > 22

2N-2

Worst case is 2n-1
As n → ∞, becomes 2n

b) n = 4

1 2 4 > 7

2N-1

n = 5

1 2 4 > 7

n+2

n = 6

1 2 4 > 7

n+1

n = 7

1 2 4 > 7

n

n = 8

1 2 4 > 7

n-1

n = 9

1 2 4 8 > 15

2n-3

Worst case: 2n-1
Best Case: n-1

n = 10

1 2 4 8 > 15

2N-5

n = 11

1 2 4 8 > 15

n+4

(c) inner loop: n

outer loop

n = 1	n = 2	n = 3	n = 4	n = 5
1	1	1	1	1
		2	2	2
				4
inner x outer: n	n	(n-1)n	(n-2)n	(n-2)n

Best case: n
Worst case: $n^2 - n$

1.4.24

The first time it should go in the middle of the building. If the egg breaks, it can go in the middle of the lower portion. If the egg doesn't break, it can check in the middle of the upper portion. This approach continues until the point at which it finds when the egg breaks.

As n gets larger, the first guess can start lower and use the above approach.

1.5.8

If there is a value at id[x] equal to id[p] when $x > p$, then id[p] will update to id[q] and id[x] will no longer equal id[p] when $i = x$.

2.3.15

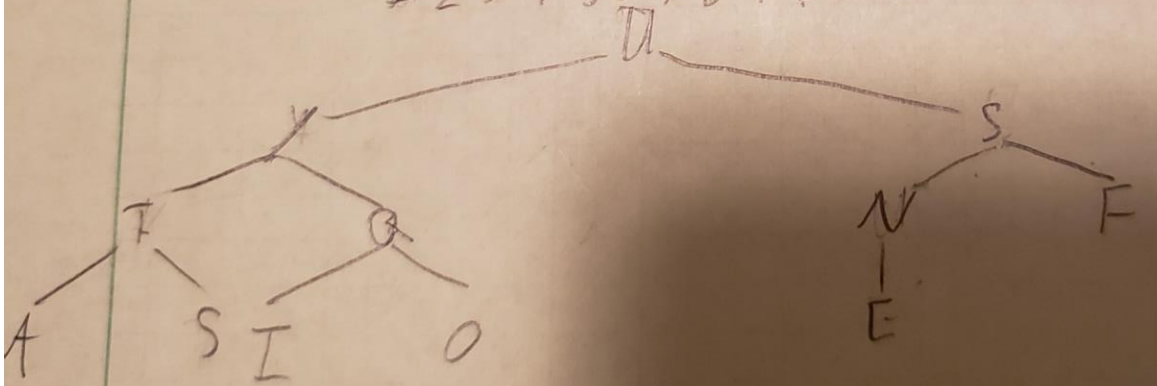
Use a linear search that removes elements that have been used

2.4.4

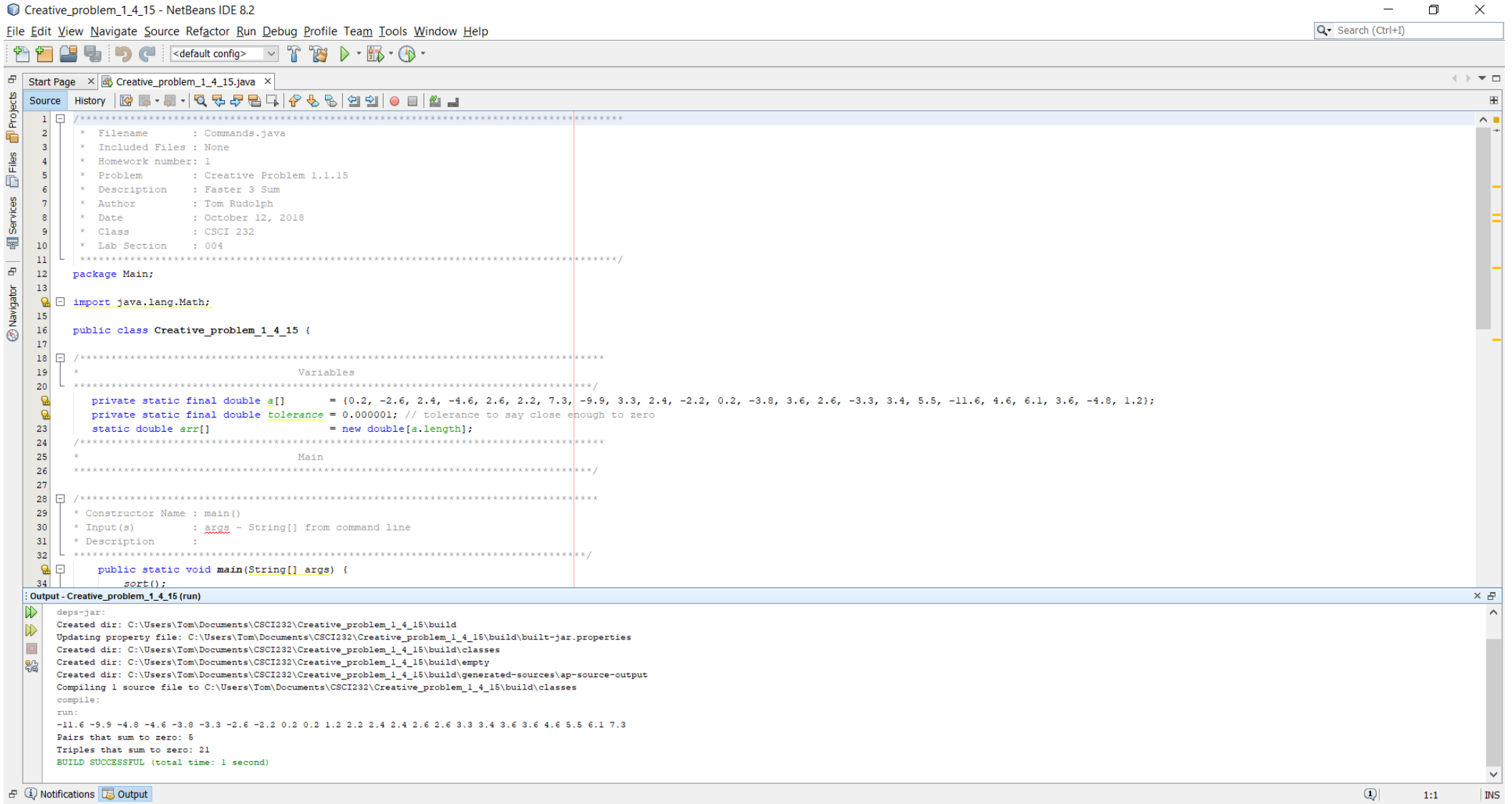
Yes, an array that is sorted in decreasing order is a max oriented heap.

2.4.5

Value:	5	1	19	25	17	22	5	19	20	9	15	19
	F	A	S	Y	Q	U	E	S	T	I	O	N
Place	1	2	3	4	5	6	7	8	9	10	11	12



UYSTQNFASIOE


Creative_problem_1_4_15 - NetBeans IDE 8.2
File Edit View Navigate Source Refactor Run Debug Profile Team Tools Window Help
Search (Ctrl+I)
<default config>
Start Page
Creative_problem_1_4_15.java
Source
History
Projects
Files
Services
Navigator
/**********
* Filename : Commands.java
* Included Files : None
* Homework number: 1
* Problem : Creative Problem 1.1.15
* Description : Faster 3 Sum
* Author : Tom Rudolph
* Date : October 12, 2018
* Class : CSCI 232
* Lab Section : 004
**********/
package Main;
import java.lang.Math;
public class Creative_problem_1_4_15 {
/**********
* Variables
**********/
private static final double a[] = {0.2, -2.6, 2.4, -4.6, 2.6, 2.2, 7.3, -9.9, 3.3, 2.4, -2.2, 0.2, -3.8, 3.6, 2.6, -3.3, 3.4, 5.5, -11.6, 4.6, 6.1, 3.6, -4.8, 1.2};
private static final double tolerance = 0.000001; // tolerance to say close enough to zero
static double arr[] = new double[a.length];
/**********
* Main
**********/
/**********
* Constructor Name : main()
* Input(s) : args - String[] from command line
* Description :
**********/
public static void main(String[] args) {
sort();
Output - Creative_problem_1_4_15 (run)
deps-jar:
Created dir: C:\Users\Tom\Documents\CSCI232\Creative_problem_1_4_15\build
Updating property file: C:\Users\Tom\Documents\CSCI232\Creative_problem_1_4_15\build\built-jar.properties
Created dir: C:\Users\Tom\Documents\CSCI232\Creative_problem_1_4_15\build\classes
Created dir: C:\Users\Tom\Documents\CSCI232\Creative_problem_1_4_15\build\empty
Created dir: C:\Users\Tom\Documents\CSCI232\Creative_problem_1_4_15\build\generated-sources\ap-source-output
Compiling 1 source file to C:\Users\Tom\Documents\CSCI232\Creative_problem_1_4_15\build\classes
compile:
run:
-11.6 -9.9 -4.8 -4.6 -3.8 -3.3 -2.6 -2.2 0.2 0.2 1.2 2.2 2.4 2.4 2.6 2.6 3.3 3.4 3.6 3.6 4.6 5.5 6.1 7.3
Pairs that sum to zero: 5
Triples that sum to zero: 21
BUILD SUCCESSFUL (total time: 1 second)
Notifications
Output
1:1
INS