INTRODUCTION TO JAVA

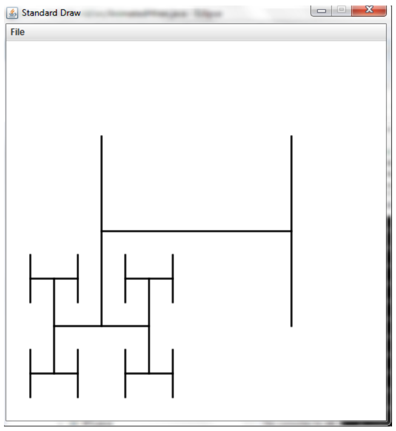
ACTIVITY 4: FUNCTIONS (PART. 2)

14. AnimatedHtree

OUTPUT:

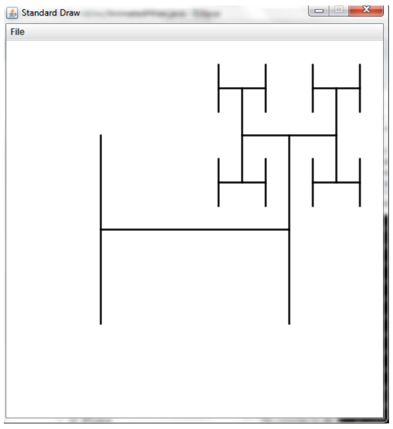
```
//BASE CASE
draw(n-1, x0, y0, size/2);   // lower left
draw(n-1, x0, y1, size/2);   // upper left
draw(n-1, x1, y0, size/2);   // lower right
draw(n-1, x1, y1, size/2);   // upper right
```

The animation start from lower left to upper right



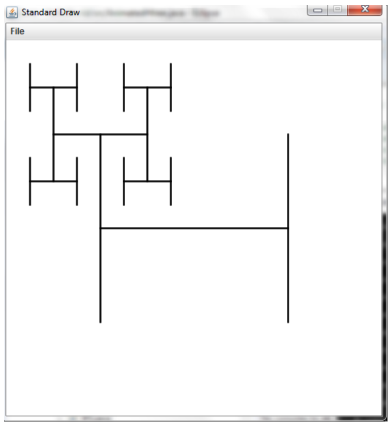
```
//CASE 2
draw(n-1, x1, y1, size/2);   // upper right
draw(n-1, x1, y0, size/2);   // lower right
draw(n-1, x0, y1, size/2);   // upper left
draw(n-1, x0, y0, size/2);   // lower left
```

The animation start from upper right to lower left



```
//CASE 3
draw(n-1, x0, y1, size/2);   // upper left
draw(n-1, x1, y1, size/2);   // upper right
draw(n-1, x0, y0, size/2);   // lower left
draw(n-1, x1, y0, size/2);   // lower right
```

The animation start from upper left to lower right



19. Combinations

OUTPUT:

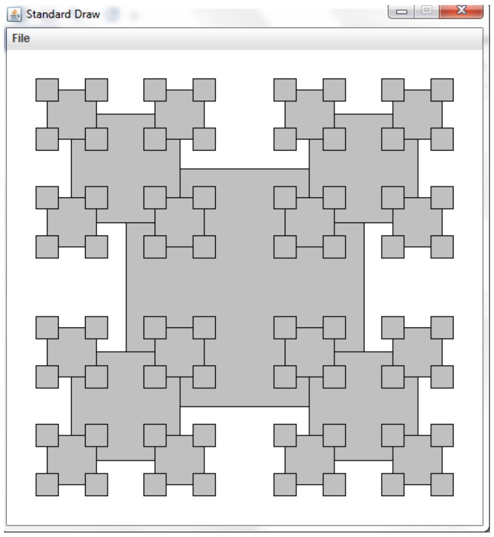
```
a
ab
abc
ac
b
bc
c


a
ab
abc
ac
b
bc
c
```

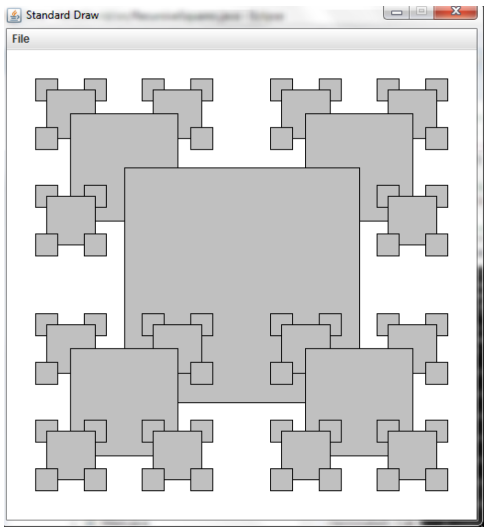
22. Recursive Squares

OUTPUT:

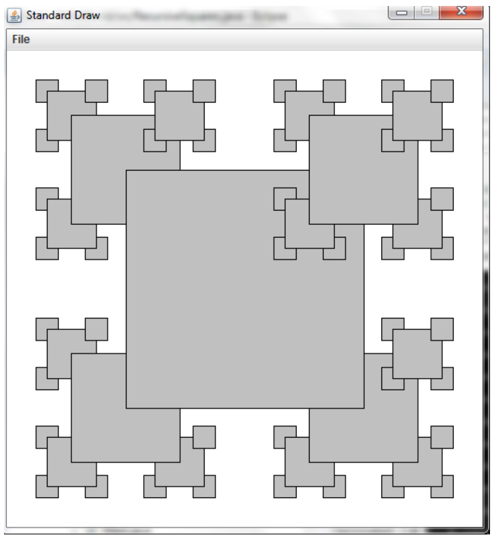
a)



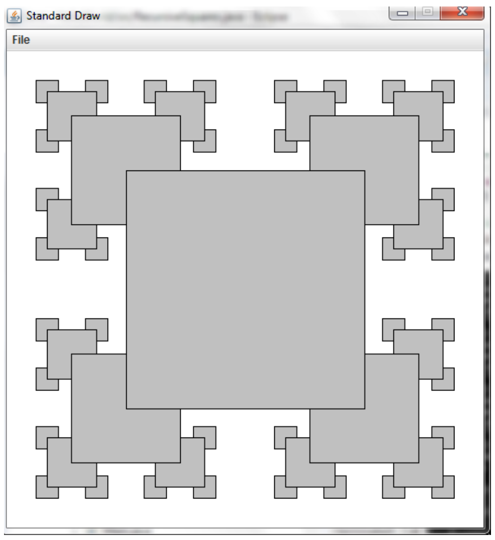
b)



c)

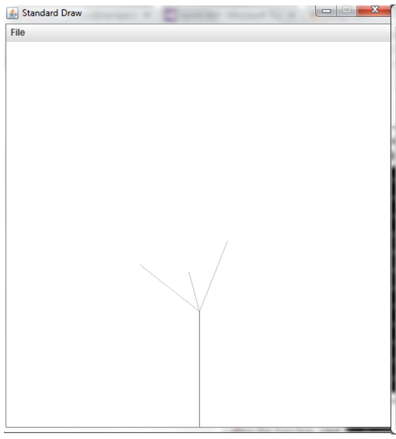


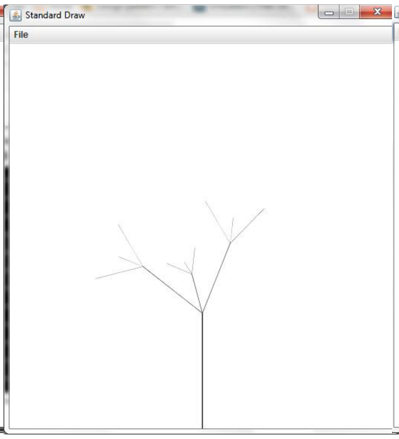
d)

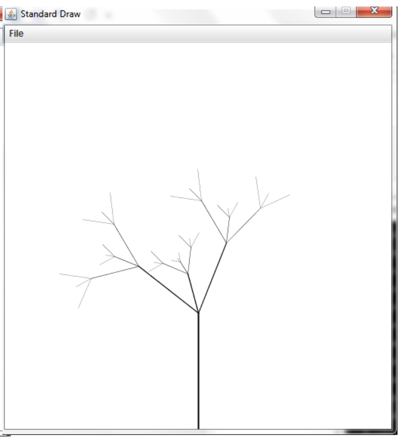


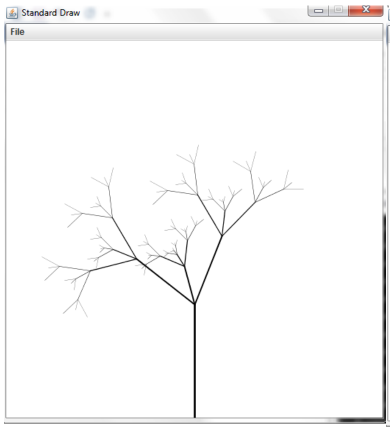
33.Recursive tree

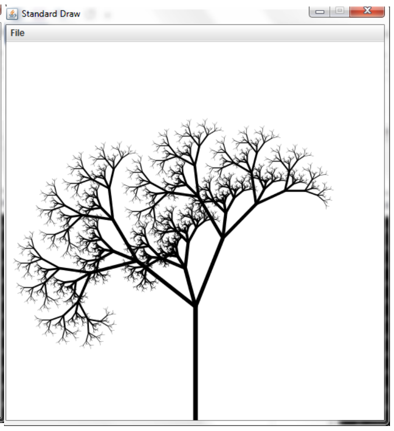
OUTPUT:











WEB EXERCISES

2. Golden Ratio

OUTPUT:

```
N=10 =>1.6181818181818182
N=20 => 1.6180339985218033
N=30 =>1.6180339887505408
```

10. Fibonacci2

With the code from Fibonacci.java, the maxim number to compute in less than 1 minute is 48:

```
1: 1 Total computing time: 0.0 seconds.
2: 1 Total computing time: 0.001 seconds.
3: 2 Total computing time: 0.001 seconds.
4: 3 Total computing time: 0.001 seconds.
5: 5 Total computing time: 0.002 seconds.
6: 8 Total computing time: 0.002 seconds.
7: 13 Total computing time: 0.002 seconds.
8: 21 Total computing time: 0.002 seconds.
9: 34 Total computing time: 0.002 seconds.
10: 55 Total computing time: 0.002 seconds.
11: 89 Total computing time: 0.002 seconds.
12: 144 Total computing time: 0.002 seconds.
13: 233 Total computing time: 0.002 seconds.
14: 377 Total computing time: 0.002 seconds.
15: 610 Total computing time: 0.002 seconds.
16: 987 Total computing time: 0.002 seconds.
17: 1597 Total computing time: 0.003 seconds.
18: 2584 Total computing time: 0.003 seconds.
19: 4181 Total computing time: 0.003 seconds.
20: 6765 Total computing time: 0.004 seconds.
21: 10946 Total computing time: 0.005 seconds.
22: 17711 Total computing time: 0.007 seconds.
23: 28657 Total computing time: 0.007 seconds.
24: 46368 Total computing time: 0.007 seconds.
25: 75025 Total computing time: 0.007 seconds.
26: 121393 Total computing time: 0.008 seconds.
27: 196418 Total computing time: 0.008 seconds.
28: 317811 Total computing time: 0.01 seconds.
29: 514229 Total computing time: 0.011 seconds.
30: 832040 Total computing time: 0.014 seconds.
31: 1346269 Total computing time: 0.019 seconds.
32: 2178309 Total computing time: 0.026 seconds.
33: 3524578 Total computing time: 0.039 seconds.
34: 5702887 Total computing time: 0.061 seconds.
35: 9227465 Total computing time: 0.095 seconds.
36: 14930352 Total computing time: 0.154 seconds.
37: 24157817 Total computing time: 0.243 seconds.
38: 39088169 Total computing time: 0.398 seconds.
39: 63245986 Total computing time: 0.633 seconds.
40: 102334155 Total computing time: 1.003 seconds.
41: 165580141 Total computing time: 1.621 seconds.
42: 267914296 Total computing time: 2.601 seconds.
43: 433494437 Total computing time: 4.224 seconds.
44: 701408733 Total computing time: 6.91 seconds.
45: 1134903170 Total computing time: 11.515 seconds.
46: 1836311903 Total computing time: 19.094 seconds.
47: 2971215073 Total computing time: 29.962 seconds.
48: 4807526976 Total computing time: 47.721 seconds.
49: 7778742049 Total computing time: 73.402 seconds.
```

With the original code Fibonacci2.java, the maximum number to compute is 93 because a validation: “Input out of bounds”. Removing this validation, I was able to compute the number 135,000 in a total in less than 1 minute:

135000: -3047139614637634528 Total computing time: 57.676 seconds.

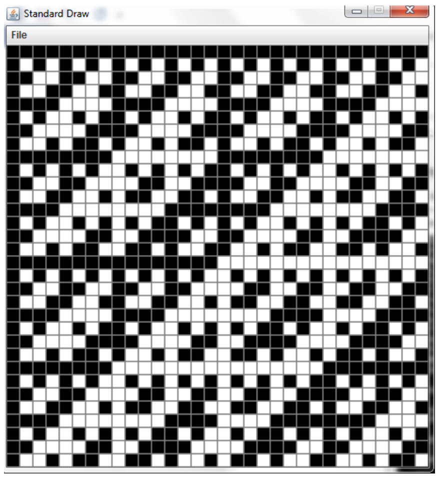
Fibonacci2 is much faster than Fibonacci

11. Dijkstra

DONE

20. Hadamard matrix.

Output using N = 5



39. Tribonacci Numbers.

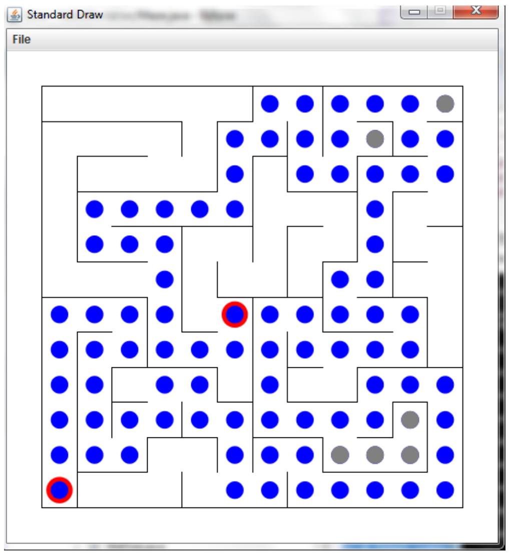
Radio successive terms: `fib(n-1) + fib(n-2) + fib(n-3)`

OUTPUT:

```
1: 0 Total computing time: 0.0 secods.
2: 1 Total computing time: 0.001 secods.
3: 1 Total computing time: 0.001 secods.
4: 2 Total computing time: 0.002 secods.
5: 4 Total computing time: 0.002 secods.
6: 7 Total computing time: 0.002 secods.
7: 13 Total computing time: 0.002 secods.
8: 24 Total computing time: 0.002 secods.
9: 44 Total computing time: 0.002 secods.
10: 81 Total computing time: 0.002 secods.
11: 149 Total computing time: 0.002 secods.
```

42. Maze generation.

OUTPUT:


Standard Draw
File