Algo HW 1

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February 2021

1

Tinkering:
n==3:
3 stars
+2 stars
+1 star

=6 stars

Therefore,
$T(n) = \frac{n(n+1)}{2}$

Proof:
$T(n+1) = \frac{(n+1)(n+2)}{2}$
$= \frac{1}{2}(n+1)(n+2)$
$= \frac{n(n+1)}{2} + (n+1)$

Passes

2

Tinkering:
n==0:
1 star

n==1:
2 stars

n==2:
4 stars

n==3:
8 stars

n==4:
16 stars

n==5:
32 stars

Therefore,
$T(n) = 2^n$

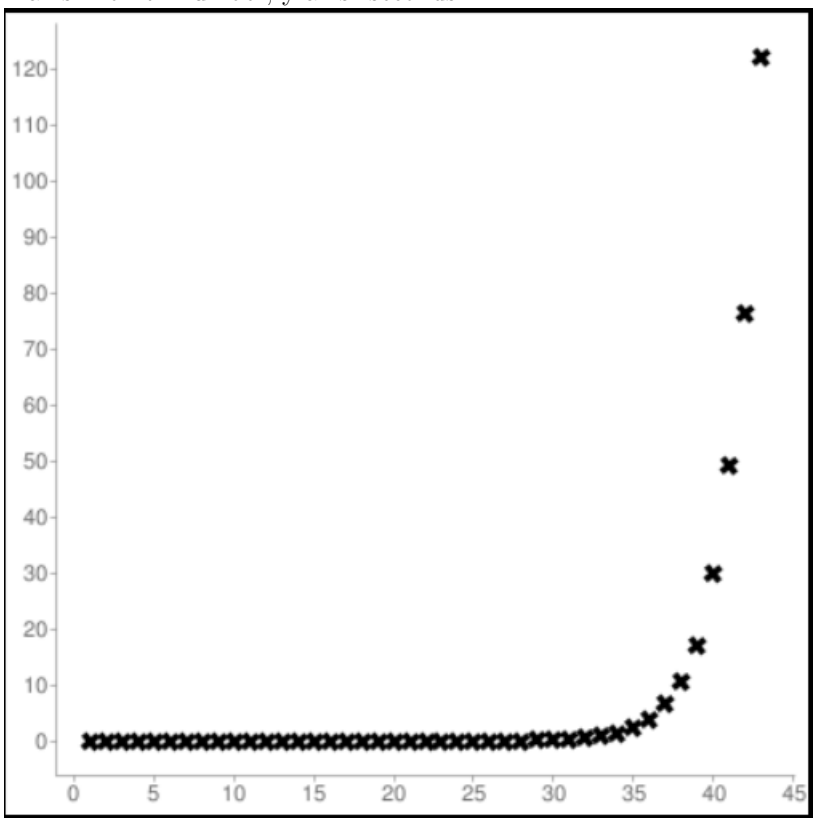
Based above pattern it is safe to assume that the equation to solve this bit of code is 2^n. Another indicator of this is the fact that n==0 generates one star, eliminating every solution involving multiplication.

3

fib1(Recursive):

1	0.0
2	0.0
3	0.0
4	0.0
5	0.0
6	0.0
7	0.0
8	0.0
9	0.0
10	0.0
11	0.0
12	0.0
13	0.0
14	0.0
15	0.0
16	0.0009703636169433594
17	0.0
18	0.0009980201721191406
19	0.0010213851928710938
20	0.0009725093841552734
21	0.003018617630004883
22	0.004986763000488281
23	0.007952451705932617
24	0.011968851089477539
25	0.017951250076293945
26	0.02892279624938965
27	0.05385589599609375
28	0.08981013298034668
29	0.18146419525146484
30	0.2413327693939209
31	0.34495115280151367
32	0.5849368572235107
33	0.883521556854248
34	1.4299066066741943
35	2.300283193588257
36	4.026912212371826
37	6.663516283035278
38	10.70595645904541
39	17.02262234687805
40	30.084028005599976
41	49.25091290473938
42	76.37921452522278
43	122.03048324584961

x-axis: fib nth number; y-axis: seconds



fib2(Iterative):

1	3.7557315826416013e-07
2	4.468412399291992e-07
3	5.505294799804688e-07
4	6.939852237701416e-07
5	8.620431423187256e-07
6	9.655525684356689e-07
7	1.1301827430725098e-06
8	1.2253713607788085e-06
9	1.3736391067504882e-06
10	1.5369129180908203e-06
11	1.8601887226104735e-06
12	1.888002634048462e-06
13	2.1299800872802733e-06
14	2.367849588394165e-06
15	2.502105474472046e-06
16	2.349030256271362e-06
17	2.6009657382965087e-06
18	2.7575817108154297e-06
19	2.8963963985443116e-06
20	3.0180318355560302e-06
21	3.323119401931763e-06
22	3.5889708995819094e-06
23	4.277255296707153e-06
24	3.491687297821045e-06
25	4.39801025390625e-06
26	4.684102296829224e-06
27	4.851470470428466e-06
28	4.702293634414673e-06
29	4.8903317451477055e-06
30	5.109051942825317e-06
31	6.120836496353149e-06
32	5.505138158798218e-06
33	5.367638349533081e-06
34	5.692257881164551e-06
35	6.03195571899414e-06
36	5.821117401123047e-06
37	6.454903364181519e-06
38	6.961136817932129e-06
39	6.386805057525634e-06
40	6.704451322555542e-06
41	6.7937805652618405e-06
42	6.722654581069947e-06
43	7.0500137805938724e-06

x-axis: fib nth number; y-axis: seconds