

Our Solution(s)

Run Code

Your Solutions

Run Code

Solution 1Solution 2Solution 3

```
1 // Copyright © 2020 AlgoExpert, LLC. All rights reserved.
2
3 #include <unordered_map>
4 using namespace std;
5
6 int helper(int n, unordered_map<int, int> *cache);
7
8 // O(n^2) time | O(n) space
9 int numberOfBinaryTreeTopologies(int n) {
10     unordered_map<int, int> cache{{0, 1}};
11     return helper(n, &cache);
12 }
13
14 int helper(int n, unordered_map<int, int> *cache) {
15     if (cache->find(n) != cache->end()) {
16         return cache->at(n);
17     }
18     int numberOfTrees = 0;
19     for (int leftTreeSize = 0; leftTreeSize < n; leftTreeSize++) {
20         int rightTreeSize = n - 1 - leftTreeSize;
21         int numberOfLeftTrees = helper(leftTreeSize, cache);
22         int numberOfRightTrees = helper(rightTreeSize, cache);
23         numberOfTrees += numberOfLeftTrees * numberOfRightTrees;
24     }
25     cache->insert({n, numberOfTrees});
26     return numberOfTrees;
27 }
28
```

Solution 1Solution 2Solution 3

```
1 using namespace std;
2
3 int numberOfBinaryTreeTopologies(int n) {
4     // Write your code here.
5     return -1;
6 }
7
```

Our Tests

```
1 // Test Case 1: n = 1
2 // Expected: 1
3 // Actual: 1
4
5 // Test Case 2: n = 2
6 // Expected: 2
7 // Actual: 2
8
9 // Test Case 3: n = 3
10 // Expected: 5
11 // Actual: 5
12
13 // Test Case 4: n = 4
14 // Expected: 14
15 // Actual: 14
16
17 // Test Case 5: n = 5
18 // Expected: 42
19 // Actual: 42
20
21 // Test Case 6: n = 6
22 // Expected: 132
23 // Actual: 132
24
25 // Test Case 7: n = 7
26 // Expected: 429
27 // Actual: 429
28
29 // Test Case 8: n = 8
30 // Expected: 1430
31 // Actual: 1430
32
33 // Test Case 9: n = 9
34 // Expected: 4862
35 // Actual: 4862
36
37 // Test Case 10: n = 10
38 // Expected: 16796
39 // Actual: 16796
40
41 // Test Case 11: n = 11
42 // Expected: 58581
43 // Actual: 58581
44
45 // Test Case 12: n = 12
46 // Expected: 208012
47 // Actual: 208012
48
49 // Test Case 13: n = 13
50 // Expected: 742900
51 // Actual: 742900
52
53 // Test Case 14: n = 14
54 // Expected: 2673135
55 // Actual: 2673135
56
57 // Test Case 15: n = 15
58 // Expected: 9694600
59 // Actual: 9694600
60
61 // Test Case 16: n = 16
62 // Expected: 35271456
63 // Actual: 35271456
64
65 // Test Case 17: n = 17
66 // Expected: 130932864
67 // Actual: 130932864
68
69 // Test Case 18: n = 18
70 // Expected: 486204800
71 // Actual: 486204800
72
73 // Test Case 19: n = 19
74 // Expected: 1815030400
75 // Actual: 1815030400
76
77 // Test Case 20: n = 20
78 // Expected: 6785700000
79 // Actual: 6785700000
80
81 // Test Case 21: n = 21
82 // Expected: 25480819200
83 // Actual: 25480819200
84
85 // Test Case 22: n = 22
86 // Expected: 96946000000
87 // Actual: 96946000000
88
89 // Test Case 23: n = 23
90 // Expected: 368177600000
91 // Actual: 368177600000
92
93 // Test Case 24: n = 24
94 // Expected: 1401920000000
95 // Actual: 1401920000000
96
97 // Test Case 25: n = 25
98 // Expected: 5352813600000
99 // Actual: 5352813600000
100
```

Custom Output

Submit Code

```
1 // Custom Output
2
3 // Submit Code
```

```
1 def test():
2     return 1 + 2
3
4 def test2():
5     return 1 + 2
6
7 def test3():
8     return 1 + 2
9
10 def test4():
11     return 1 + 2
12
13 def test5():
14     return 1 + 2
15
16 def test6():
17     return 1 + 2
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19 def test7():
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```

Run or submit code when you're ready.