



Quiz: Disjoint Sets

[Continue Course](#)**3/4** points earned (75%)[Back to Week 2](#)

Quiz passed!

1 / 1
points

1.

Consider the following program:

```
for i from 1 to 12:
    MakeSet(i)
Union(2, 10)
Union(7, 5)
Union(6, 1)
Union(3, 4)
Union(5, 11)
Union(7, 8)
Union(7, 3)
Union(12, 2)
Union(9, 6)
print(Find(6))
print(Find(3))
print(Find(11))
print(Find(9))
```

Assume that the disjoint sets data structure is implemented as an array `smallest[1...12]`: `smallest[i]` is equal to the smallest element in the set containing i .

What is the output of the following program? As an answer, enter four integers separated by spaces.

1 3 3 1

Correct Response



1 / 1
points

2.

Consider the program:

```
for i from 1 to 12:  
    MakeSet(i)  
Union(2, 10)  
Union(7, 5)  
Union(6, 1)  
Union(3, 4)  
Union(5, 11)  
Union(7, 8)  
Union(7, 3)  
Union(12, 2)  
Union(9, 6)
```

Assume that the disjoint sets data structure is implemented as disjoint trees with union by rank heuristic.

Compute the product of the heights of the resulting trees after executing the code. For example, for a forest consisting of four trees of height 1, 2, 3, 1 the answer would be 6. (Recall that the height of a tree is the number of edges on a longest path from the root to a leaf. In particular, the height of a tree consisting of just one node is equal to 0.)

2

Correct Response

Right! There will be 3 trees of height 1, 1, and 2.

1 / 1
points

3.

Consider the following program:

```
for i from 1 to n:  
    MakeSet(i)  
for i from 1 to n-1:  
    Union(i, i+1)
```

Assume that the disjoint sets data structure is implemented as disjoint trees with union by rank heuristic.

What is the number of trees in the forest and the maximum height of a tree in this forest after executing this code? (Recall that the height of a tree is the number of edges on a longest path from the root to a leaf. In particular, the height of a tree consisting of just one node is equal to 0.)

- ☐ One tree of height $\log_2 n$.
- ☐ n trees, the maximum height is 1.
- ☐ $\log_2 n$ trees, the maximum height is 1.
- ☒ One tree of height 1.

**Correct Response**

- ☐ $n/2$ trees, the maximum height is 2.
- ☐ Two trees, both of height 1.

0 / 1
points

4.

Consider the following program:

Consider the following program:

```
for i from 1 to 60:  
    MakeSet(i)  
for i from 1 to 30:  
    Union(i, 2*i)  
for i from 1 to 20:  
    Union(i, 3*i)  
for i from 1 to 12:  
    Union(i, 5*i)  
for i from 1 to 60:  
    Find(i)
```

Assume that the disjoint sets data structure is implemented as disjoint trees with union by rank heuristic and with path compression heuristic.

Compute the maximum height of a tree in the resulting forest. (Recall that the height of a tree is the number of edges on a longest path from the root to a leaf. In particular, the height of a tree consisting of just one node is equal to 0.)

Enter answer here

Incorrect Response

The answer you gave is not a number.

