T.A. Help Session: Union Find

ANSWER KEY

1. a. Show the resulting up Tree data structure after the following unions (no union-by-size):

union(1,5), union(3,7), union(5,6), union(1,4), union(6,2), union(5,3)

b. Fill in the resulting up-tree array implementation with

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>up</td>
<td>0</td>
<td>6</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>weight</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

What is the worst-case runtime of a union operation? \(O(1)\)
find operation? \(O(N)\)

c. Now show the resulting up-tree data structure after the following finds, utilizing path compression:

find(7)
find(2)