Module 1 - Activity 7

Question:

Show the contents of the id[] array and the number of times the array is accessed for each input pair when you use quick-find, quick-union, weighted quick-union, weighted quick-union path compression, for the sequence of inputs 9-0 3-4 5-8 7-2 2-1 5-7 0-3 4-2.

Solution: Quick Find:

Indexes:	0	1	2	3	4	5	6	7	8	9
	0	1	2	3	4	5	6	7	8	9
union(9,0)	0	1	2	3	4	5	6	7	8	0
union(3,4)	0	1	2	4	4	5	6	7	8	0
union(5,8)	0	1	2	4	4	8	6	7	8	0
union(7,2)	0	1	2	4	4	8	6	2	8	0
union(2,1)	0	1	1	4	4	8	6	1	8	0
union(5,7)	0	1	1	4	4	1	6	1	1	0
union(0,3)	4	1	1	4	4	1	6	1	1	4
union(4,2)	1	1	1	1	1	1	6	1	1	1

Quick Union:

Indexes:	0	1	2	3	4	5	6	7	8	9
	0	1	2	3	4	5	6	7	8	9
union(9,0)	0	1	2	3	4	5	6	7	8	0
union(3,4)	0	1	2	4	4	5	6	7	8	0
union(5,8)	0	1	2	4	4	8	6	7	8	0
union(7,2)	0	1	2	4	4	8	6	2	8	0

union(2,1)	0	1	1	4	4	8	6	2	8	0
union(5,7)	0	1	1	4	4	8	6	2	1	0
union(0,3)	4	1	1	4	4	8	6	2	1	0
union(4,2)	4	1	1	4	1	8	6	2	1	0

Weighted Quick Union:

0									
U	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9
1	1	1	1	1	1	1	1	1	1
9	1	2	3	4	5	6	7	8	9
1	1	1	1	1	1	1	1	1	2
9	1	2	3	3	5	6	7	8	9
1	1	1	2	1	1	1	1	1	2
9	1	2	3	3	5	6	7	5	9
1	1	1	2	1	2	1	1	1	2
9	1	7	3	3	5	6	7	5	9
1	1	1	2	1	2	1	2	1	2
9	7	7	3	3	5	6	7	5	9
1	1	2	2	1	2	1	2	1	2
9	7	7	3	3	7	6	7	5	9
1	1	2	2	1	4	1	2	1	2
9	7	7	9	3	7	6	7	5	9
1	1	2	3	1	4	1	2	1	2
9	7	7	9	3	7	6	7	5	7
1	1	3	3	1	4	1	2	1	2
	0 1 9 1 9 1 9 1 9 1 9 1 9 1 9 1 9 1 9	0 1 1 1 9 1 1 1 9 1 1 1 9 1 1 1 9 1 1 1 9 7 1 1 9 7 1 1 9 7 1 1 9 7	0 1 2 1 1 1 9 1 2 1 1 1 9 1 2 1 1 1 9 1 7 1 1 1 9 7 7 1 1 2 9 7 7 1 1 2 9 7 7 1 1 2 9 7 7 1 1 2 9 7 7 1 1 2 9 7 7 1 1 2 9 7 7	0 1 2 3 1 1 1 1 9 1 2 3 1 1 1 1 9 1 2 3 1 1 1 2 9 1 7 3 1 1 1 2 9 7 7 3 1 1 2 2 9 7 7 3 1 1 2 2 9 7 7 9 1 1 2 3 9 7 7 9 1 1 2 3 9 7 7 9 1 1 2 3 9 7 7 9	0 1 2 3 4 1 1 1 1 1 9 1 2 3 4 1 1 1 1 1 9 1 2 3 3 1 1 1 2 1 9 1 2 3 3 1 1 1 2 1 9 7 7 3 3 1 1 2 1 9 7 7 3 3 1 1 2 2 1 9 7 7 3 3 1 1 2 2 1 9 7 7 9 3 1 1 2 3 1 1 1 2 3 1 1 2 3 1 1 2 3 1 1 2 3 1 2 </td <td>0 1 2 3 4 5 1 1 1 1 1 1 9 1 2 3 4 5 1 1 1 1 1 1 9 1 2 3 3 5 1 1 1 2 1 1 9 1 2 3 3 5 1 1 1 2 1 2 9 1 7 3 3 5 1 1 1 2 1 2 9 7 7 3 3 5 1 1 2 2 1 2 9 7 7 3 3 7 1 1 2 2 1 4 9 7 7 9 3 7 1 1 2 3 1 4 9 7 7 9 3</td> <td>0 1 2 3 4 5 6 1 1 1 1 1 1 1 9 1 2 3 4 5 6 1 1 1 1 1 1 1 9 1 2 3 3 5 6 1 1 1 2 1 1 1 9 1 2 3 3 5 6 1 1 1 2 1 2 1 9 1 7 3 3 5 6 1 1 1 2 1 2 1 9 7 7 3 3 5 6 1 1 2 2 1 2 1 9 7 7 3 3 7 6 1 1 2 2 1 4 1 9 7 7 9 3 <t< td=""><td>0 1 2 3 4 5 6 7 1 1 1 1 1 1 1 1 9 1 2 3 4 5 6 7 1 1 1 1 1 1 1 1 9 1 2 3 3 5 6 7 1 1 1 2 1 1 1 1 9 1 2 3 3 5 6 7 1 1 1 2 1 2 1 1 9 1 7 3 3 5 6 7 1 1 1 2 1 2 1 2 9 7 7 3 3 5 6 7 1 1 2 2 1 2 1 2 9 7 7 3 3 7 6 7</td><td>0 1 2 3 4 5 6 7 8 1 1 1 1 1 1 1 1 1 9 1 2 3 4 5 6 7 8 1 1 1 1 1 1 1 1 1 9 1 2 3 3 5 6 7 8 1 1 1 1 1 1 1 1 1 9 1 2 3 3 5 6 7 5 1 1 1 2 1 2 1 1 1 9 1 7 3 3 5 6 7 5 1 1 1 2 1 2 1 2 1 9 7 7 3 3 5 6 7 5 1 1 2 2 1 2 1 2</td></t<></td>	0 1 2 3 4 5 1 1 1 1 1 1 9 1 2 3 4 5 1 1 1 1 1 1 9 1 2 3 3 5 1 1 1 2 1 1 9 1 2 3 3 5 1 1 1 2 1 2 9 1 7 3 3 5 1 1 1 2 1 2 9 7 7 3 3 5 1 1 2 2 1 2 9 7 7 3 3 7 1 1 2 2 1 4 9 7 7 9 3 7 1 1 2 3 1 4 9 7 7 9 3	0 1 2 3 4 5 6 1 1 1 1 1 1 1 9 1 2 3 4 5 6 1 1 1 1 1 1 1 9 1 2 3 3 5 6 1 1 1 2 1 1 1 9 1 2 3 3 5 6 1 1 1 2 1 2 1 9 1 7 3 3 5 6 1 1 1 2 1 2 1 9 7 7 3 3 5 6 1 1 2 2 1 2 1 9 7 7 3 3 7 6 1 1 2 2 1 4 1 9 7 7 9 3 <t< td=""><td>0 1 2 3 4 5 6 7 1 1 1 1 1 1 1 1 9 1 2 3 4 5 6 7 1 1 1 1 1 1 1 1 9 1 2 3 3 5 6 7 1 1 1 2 1 1 1 1 9 1 2 3 3 5 6 7 1 1 1 2 1 2 1 1 9 1 7 3 3 5 6 7 1 1 1 2 1 2 1 2 9 7 7 3 3 5 6 7 1 1 2 2 1 2 1 2 9 7 7 3 3 7 6 7</td><td>0 1 2 3 4 5 6 7 8 1 1 1 1 1 1 1 1 1 9 1 2 3 4 5 6 7 8 1 1 1 1 1 1 1 1 1 9 1 2 3 3 5 6 7 8 1 1 1 1 1 1 1 1 1 9 1 2 3 3 5 6 7 5 1 1 1 2 1 2 1 1 1 9 1 7 3 3 5 6 7 5 1 1 1 2 1 2 1 2 1 9 7 7 3 3 5 6 7 5 1 1 2 2 1 2 1 2</td></t<>	0 1 2 3 4 5 6 7 1 1 1 1 1 1 1 1 9 1 2 3 4 5 6 7 1 1 1 1 1 1 1 1 9 1 2 3 3 5 6 7 1 1 1 2 1 1 1 1 9 1 2 3 3 5 6 7 1 1 1 2 1 2 1 1 9 1 7 3 3 5 6 7 1 1 1 2 1 2 1 2 9 7 7 3 3 5 6 7 1 1 2 2 1 2 1 2 9 7 7 3 3 7 6 7	0 1 2 3 4 5 6 7 8 1 1 1 1 1 1 1 1 1 9 1 2 3 4 5 6 7 8 1 1 1 1 1 1 1 1 1 9 1 2 3 3 5 6 7 8 1 1 1 1 1 1 1 1 1 9 1 2 3 3 5 6 7 5 1 1 1 2 1 2 1 1 1 9 1 7 3 3 5 6 7 5 1 1 1 2 1 2 1 2 1 9 7 7 3 3 5 6 7 5 1 1 2 2 1 2 1 2

Weighted Quick Union - Path Compression:

Indexes:	0	1	2	3	4	5	6	7	8	9
	0	1	2	3	4	5	6	7	8	9
union(9,0)	9	1	2	3	4	5	6	7	8	9
union(3,4)	9	1	2	3	3	5	6	7	8	9
union(5,8)	9	1	2	3	3	5	6	7	5	9
union(7,2)	9	1	7	3	3	5	6	7	5	9
union(2,1)	9	7	7	3	3	5	6	7	5	9
union(5,7)	9	7	7	3	3	7	6	7	5	9
union(0,3)	9	7	7	9	3	7	6	7	5	9
union(4,2)	9	7	7	9	9	7	6	7	5	7