

CSE310 HW06, Thursday, 04/22/2010, Due: Thursday, 04/29/2010

Please note that you have to typeset your assignment using either \LaTeX or Microsoft Word. Hand-written assignment will not be graded. You need to submit a hardcopy before the lecture on the due date. You also need to submit an electronic version at the digital drop box. For the electronic version, you should name your file using the format HW06-LastName-FirstName.

1. (5 pts) Assume that a hash table has 7 slots and the hash function is $h(k) = k \bmod 7$. Demonstrate the insertion of the keys 5, 28, 19, 15, 20, 33, 12, 17, 10 into the hash table with collisions resolved by chaining.

Solution:

The resulted hash table is:

0 \rightarrow 28

1 \rightarrow 15

2

3 \rightarrow 10 \rightarrow 17

4

5 \rightarrow 12 \rightarrow 33 \rightarrow 19 \rightarrow 5

6 \rightarrow 20

Grading Keys:

+0.5pts for each correct map;

+0.5pts for correct chaining.

2. (5 pts) Consider a hash table of size $m = 100$ and a corresponding hash function $h(k) = \lfloor m(kA \bmod 1) \rfloor$ for $A = 0.618$. Compute the locations to which the keys 61, 62, 63, 64, 65 are mapped.

Solution:

61 → 69

62 → 31

63 → 93

64 → 55

65 → 17

Grading Keys:

1pt for each correct map.

3. (10 pts) Write the adjacency list and the adjacency matrix of the graph in Figure 22.9(c) of the textbook.

Solution:

The adjacency list is as follows.

abe : *cd* → *fg*

cd : *fg* → *h*

fg : *h*

h :

Grading Keys:

1pt for each node;

1 bonus pt for all correct nodes.

The adjacency matrix is shown in figure 1.

	abe	cd	fg	h
abe	0	1	1	0
cd	0	0	1	1
fg	0	0	0	1
h	0	0	0	0

Figure 1: adjacency matrix

Grading Keys:

1pt for each correct row;

1 bonus pt for all correct rows.

4. (10 pts) Let G be the graph in Figure 23.5(a) with the weights of edges (b, c) and (a, h) changed from 8 to 2. Compute an MST of G using Kruskal's algorithm. Show the edges selected into the tree in the correct order.

Solution:

The MST is show in figure 2. In figure 2, the MST is connected using dark edges.

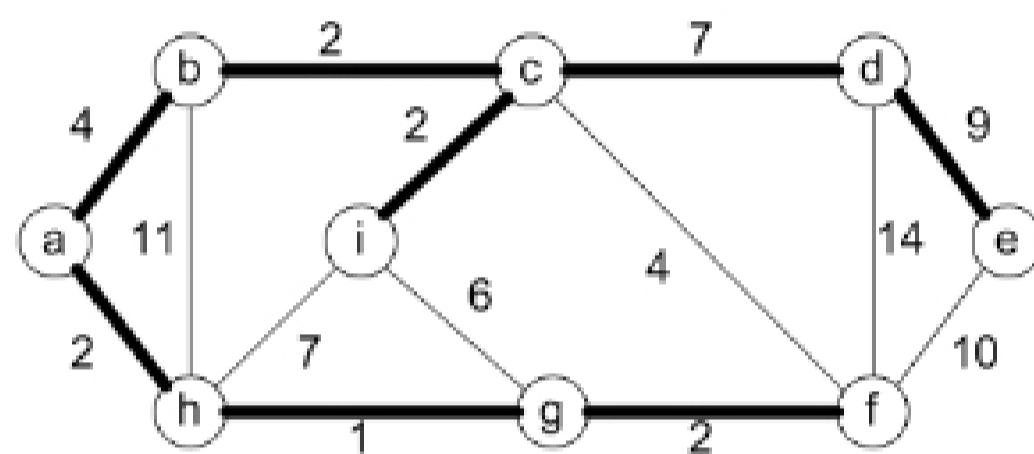


Figure 2: The MST computed using Kruskal's algorithm

The order of the edges selected into the tree: hg, ah, bc, ci, gf, ab, cd, de.

Grading Keys:

1pt for each correct selection;

2 bonus pts for all correct selections.

5. (10 pts) Let G be the graph in Figure 23.5(a). Show the BFS tree obtained starting from vertex a . Show the DFS tree obtained starting from vertex a , showing the discovery time and finish time of each vertex.

Solution:

The obtained BFS tree is shown in figure 3.