Name: Student ID:

Quiz #11 (4%)

CS2336 Discrete Mathematics, Instructor: Cheng-Hsin Hsu

Department of Computing Science, National Tsing Hua University, Taiwan

3:30 - 3:50 p.m., June 10th, 2013

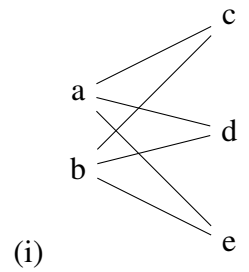
This is a closed book test. Any academic dishonesty will automatically lead to zero point.

1) (1%) Find two non-isomorphic spanning trees for the complete bipartite graph $K_{2,3}$.

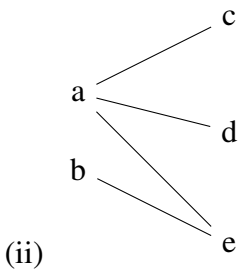
Answer:

In part (i) of the given figure we find the complete bipartite graph $K_{2,3}$.

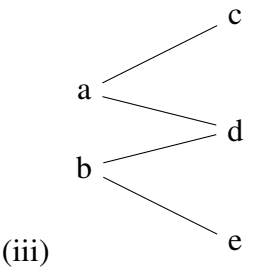
Parts (ii) and (iii) of the figure provide two nonisomorphic spanning trees for $K_{2,3}$.



(i)



(ii)



(iii)

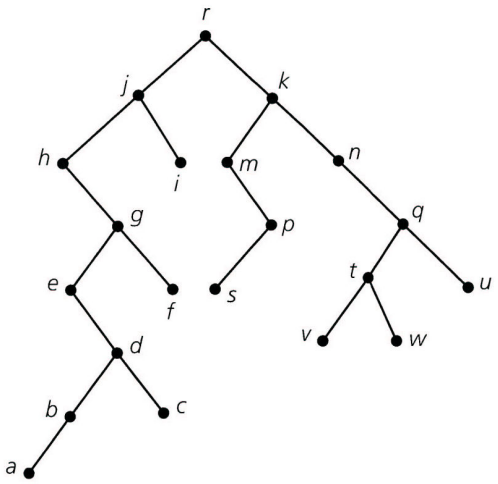


Figure 12.30

2) (1%) List the vertices according to an inorder traversal, a preorder traversal, and a postorder traversal.

Answer:

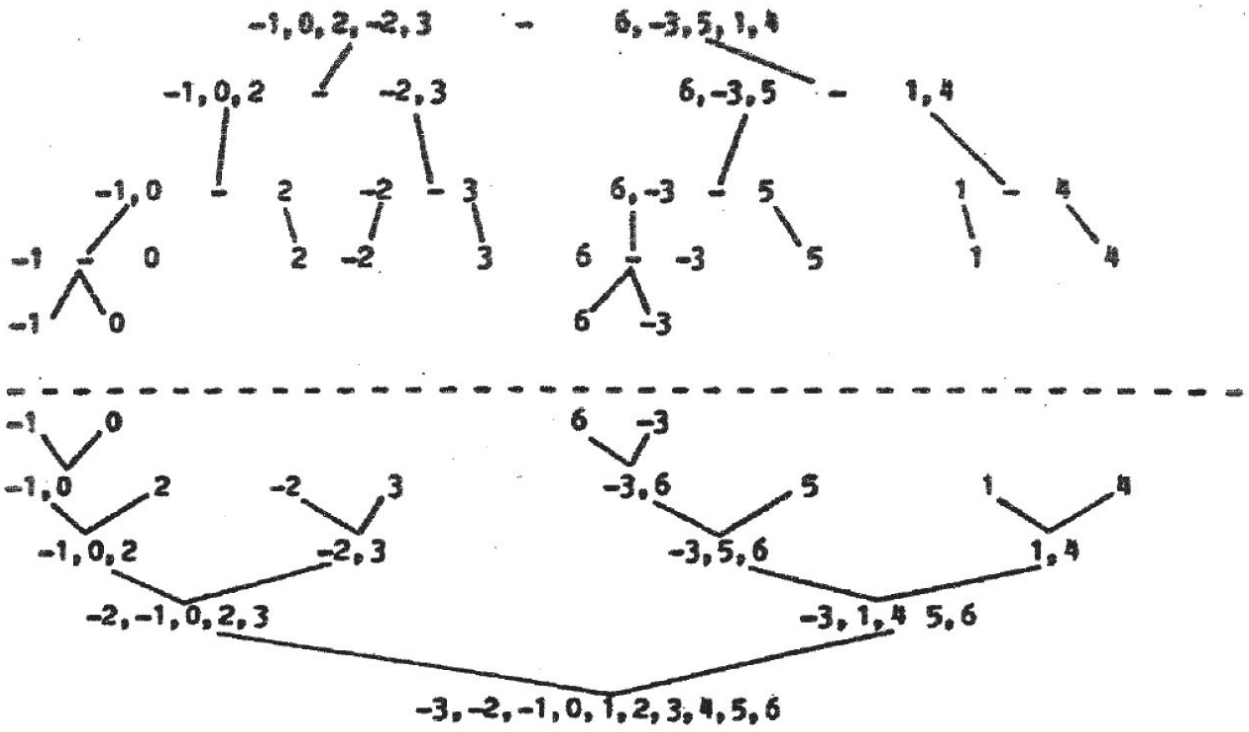
Inorder: $h, e, a, b, d, c, g, f, j, i, r, m, s, p, k, n, v, t, w, q, u$

Preorder: $r, j, h, g, e, d, b, a, c, f, i, k, m, p, s, n, q, t, v, w, u$

Psotorder: $a, b, c, d, e, f, g, h, i, j, s, p, m, v, w, t, u, q, n, k, r$

3) (1%) Apply merge sort to the list: -1, 0, 2, -2, 3, 6, -3, 5, 1, 4. Show each of the (splitting and merging) steps.

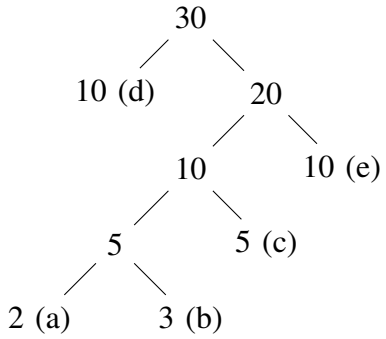
Answer:



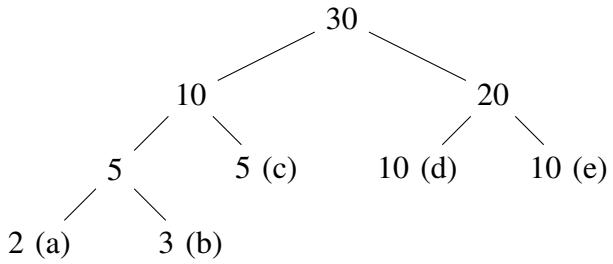
4) (1%) Using the weights 2, 3, 5, 10, 10 for symbols a, b, c, d, e. Demonstrate that there are more than one Huffman trees for the distribution.

Answer:

(i)



(ii)



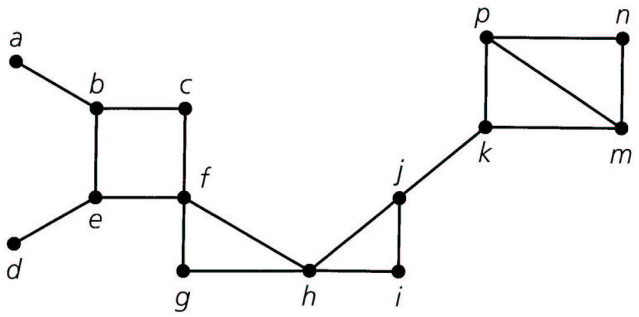


Figure 12.44

5) (1%) Find the articulation points and biconnected components in the figure.

Answer:

The articulation points are b,e,f,h,j,k.

The biconnected components are

$B_1 : \{\{a, b\}\}$

$B_2 : \{\{d, e\}\}$

$B_3 : \{\{b, c\}, \{c, f\}, \{f, e\}, \{e, b\}\}$

$B_4 : \{\{f, g\}, \{g, h\}, \{h, f\}\}$

$B_5 : \{\{h, i\}, \{i, j\}, \{j, h\}\}$

$B_6 : \{\{j, k\}\}$

$B_7 : \{\{k, p\}, \{p, n\}, \{n, m\}, \{m, k\}, \{p, m\}\}$