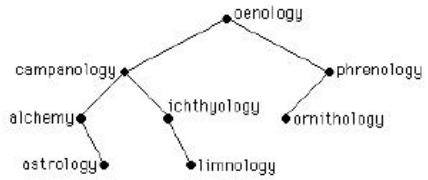
SE 3306 Homework 6 Solutions

Chapter 11.2

2. Max points possible - 4

We make the first word the root. Since the second word follows the first in alphabetical order, we make it the right child of the root. Similarly the third word is the left child of the root. To place the next word, *ornithology*, we move right from the root, since it follows the root in alphabetical order, and then move left from *phrenology*, since it comes before that word. The rest of the tree is built in a similar manner.



19. Max points possible - 3

a) Yes

21. Max points possible - 7

a: 000, e: 001, i: 01, k: 1100, o: 1101, p: 11110, u: 11111

23. Max points possible - 8

a: 11; b: 101; c: 100; d: 01; e: 00; 2.25 bits (Note: This coding depends on how ties are broken, but the average number of bits is always the same.)

Chapter 11.3

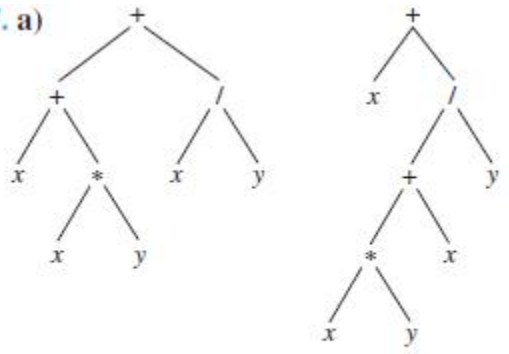
7. Max points possible - 4
a, b, d, e, f, g, c

10. Max points possible - 4
The left subtree of the root comes first, namely the tree rooted at b. There again the left subtree comes first, so the list begins with d. After that comes b, the root of this subtree, and then the right subtree of b, namely (in order) f , e, and g . Then comes the root of the entire tree and finally its right child. Thus the answer is d, b, f, e, g, a, c.

13. Max points possible - 4
d, f, g, e, b, c, a

17. Max points possible - 16

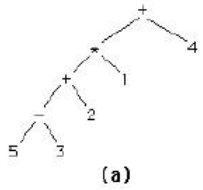
17. a)



b) $++x*xy/xy, +x/+*xyxy$ **c)** $xxy*+xy/+, xxy*x+y/+$
d) $((x + (x * y)) + (x/y)), (x + (((x * y) + x)/y))$

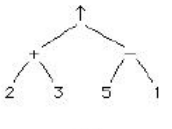
22. Max points possible - 12

We work from the beginning of the expression. In part (a) the root of the tree is necessarily the first $+$. We then use up as much of the rest of the expression as needed to construct the left subtree of the root. The root of this left subtree is the $*$, and its left subtree is as much of the rest of the expression as is needed. We continue in this way, making our way to the subtree consisting of root $-$ and children 5 and 3. Then the 2 must be the right child of the second $+$, the 1 must be the right child of the $*$, and the 4 must be the right child of the root. The result is shown here.

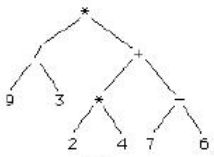


(a)

In infix form we have $((((5 - 3) + 2) * 1) + 4)$. The other two trees are constructed in a similar manner.



(b)



(c)

The infix expressions are therefore $((2 + 3) \uparrow (5 - 1))$ and $((9/3) * ((2 * 4) + (7 - 6)))$, respectively.

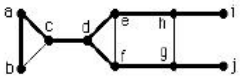
Chapter 11.4

6. Max points possible - 6
There are many, many possible answers. One set of choices is to remove edges {a, e}, {a, h}, {b, g}, {c, f}, {c, j}, {d, k}, {e, i}, {g, l}, {h, l}, and {i, k}.

13. Max points possible - 6

16. Max points possible - 6

If we start at vertex a and use alphabetical order, then the breadth-first search spanning tree is unique. Consider the graph in Exercise 13. We first fan out from vertex a, picking up the edges $\{a, b\}$ and $\{a, c\}$. There are no new vertices from b, so we fan out from c, to get edge $\{c, d\}$. Then we fan out from d to get edges $\{d, e\}$ and $\{d, f\}$. This process continues until we have the entire tree shown in heavy lines below.



Chapter 11.5

3. Max points possible - 10

{e, f }, {c, f }, {e, h}, {h, i}, {b, c}, {b, d}, {a, d}, {g, h}

7. Max points possible - 10

{e, f }, {a, d}, {h, i}, {b, d}, {c, f }, {e, h}, {b, c}, {g, h}