Solutions

Each answer shows the steps, then the **result**.

2.1

- root 8, with 3 left and 10 right
- 1 and 6 below 3; 14 right of 10
- 4 left and 7 right of 6

2.2

- root **8**
- leaves **1, 4, 7, 14**

2.3

- in-order **1, 3, 4, 6, 7, 8, 10, 14**
- pre-order **8, 3, 1, 6, 4, 7, 10, 14**

2.4

- **8, 3, 6, 7**

3.1 B

- left, node, right gives ascending order

3.2 A

- $1023 = 2^{10} - 1$: 10 levels

3.3 D

- post-order visits the root last

3.4

(a)

- root `lion`, with `deer` left and `tiger` right
- `ant` and `fox` below `deer`
- `owl` left and `zebra` right of `tiger`

(b)

- **ant, fox, deer, owl, zebra, tiger, lion**

(c)

- `lion`, `deer`, `fox`
- the right of `fox` is empty: **not found**

(d)

- each word is larger than the last, so each goes right: the tree is one chain
- search becomes $O(n)$ instead of $O(\log n)$
- fix: shuffle the words before inserting, or build the tree from the middle word outwards (or use a self-balancing tree)