1

a) It will be a weakly connected directed graph.

The direction is implied by one-way/two-way roads and it's weakly connected because there cannot be a vertex without an edge as vertices are intersections.

b) Suppose, there are o odd-degree vertices and e even-degree vertices.

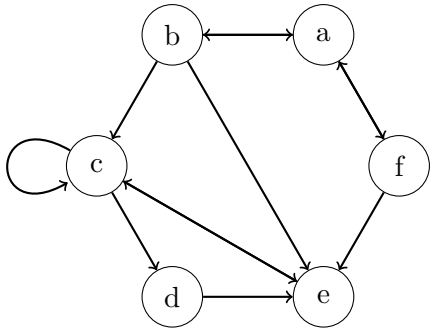
Therefore we have the following equations.

$$\begin{cases} 3o & + & 4e & = & 19 \times 2 \\ o & + & e & = & 11 \end{cases}$$

By solving them we find $o = 6$ and $e = 5$.

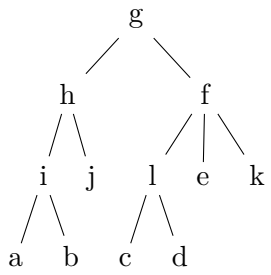
2

c) Graph from the given adjacency matrix:



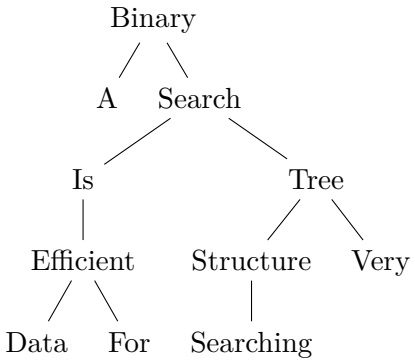
3

a) Tree following the given info:



4

a) Binary search tree:



b) A, Data, For, Efficient, Is, Searching, Structure, Very, Tree, Search, Binary

c) Nope; A is leaf at height 2 when the height of the tree is 4.

5

b) Possible combinations of outcome are (1 heads, 5 tails) or (3 heads, 3 tails) or (5 heads, 1 tails). So the number of possible outcomes is 3

c) First we take the possible combinations of courses that a student has to finish, the number of possible combinations of such courses is $\mathrm{C}(n_1, r_1) \times \mathrm{C}(n_2, r_2)$.

For every such combination there can be different order of completion. The number of ways $r_1 + r_2$ courses can be finished $= (r_1 + r_2)!$.

Therefore the total number of ways a student can complete the courses $= \mathrm{C}(n_1, r_1) \times \mathrm{C}(n_2, r_2) \times (r_1 + r_2)!$