

Sample Solutions Tutorial 2 - Trees

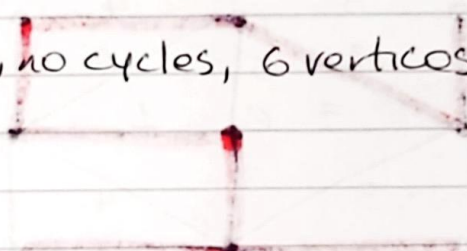
Question 1: Tree - connected graph, no cycles, if there are n vertices then $n-1$ edges...

a) Tree, connected, no cycles, 6 vertices, 5 edges

b) Not a Tree ~ contains cycles...

c) Not a Tree ~ contains cycles

d) Tree, connected, no cycles, 6 vertices, $6-1=5$ edges.



Question 2:

	A	B	C	D	E	F
A	0	4	∞	∞	15	20
B	4	0	10	7	12	∞
C	∞	10	0	6	∞	∞
D	∞	7	6	0	25	∞
E	15	12	∞	25	0	22
F	20	∞	∞	∞	22	0

∞ - infinity symbol

Question 3:

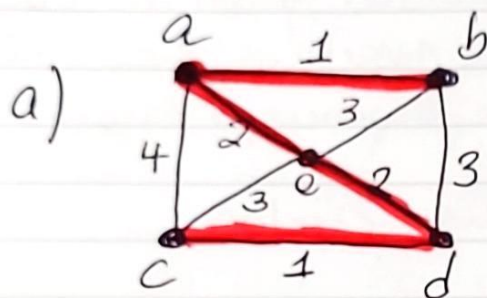
a) see lecture notes.... Prim's Algorithm.

b) start at A

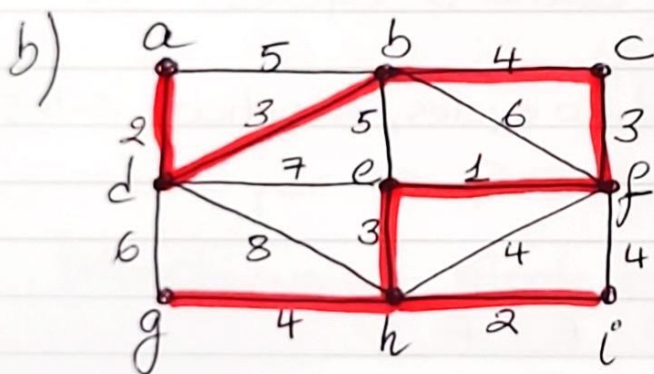
$T = \{ \underset{\text{edges}}{A \text{ ab } B \text{ ad } D \text{ dc } C \text{ ce } E} \}$ 5 vertices
4 edges

Contains the original vertices, n vertices, $n-1$ edges, no cycle

Question 4:



$$T = \{Aab, Bae, Ead, Ddc, C\}$$



$$T = \{Aad, Ddb, Bbc, Ccf, Ffe, Eeh, Hhi, i, hg, Gg\}$$

Question 6: see lecture notes for description...

Question 7:

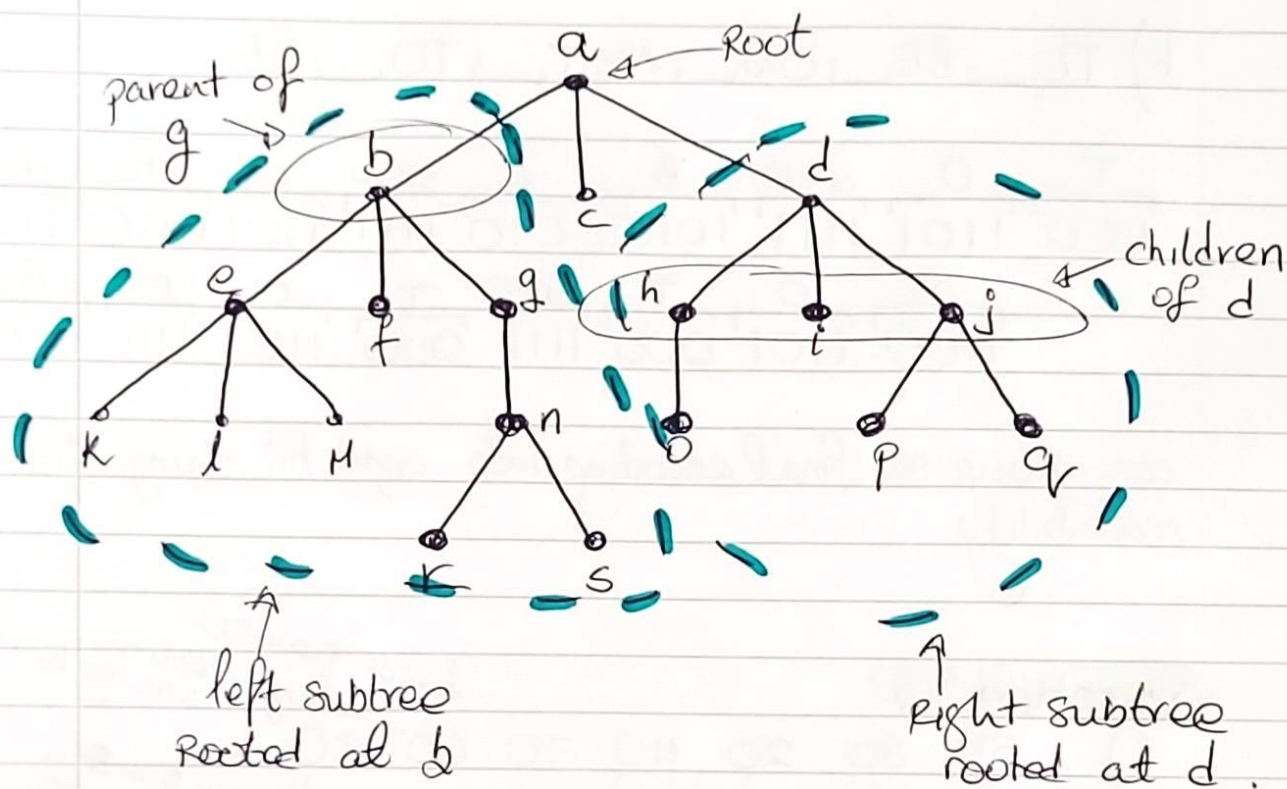
root ~ a

children of d ~ h, e, j

parent of g ~ b

leaf nodes ~ k, l, m, p, r, s, c, o, i, p, q,

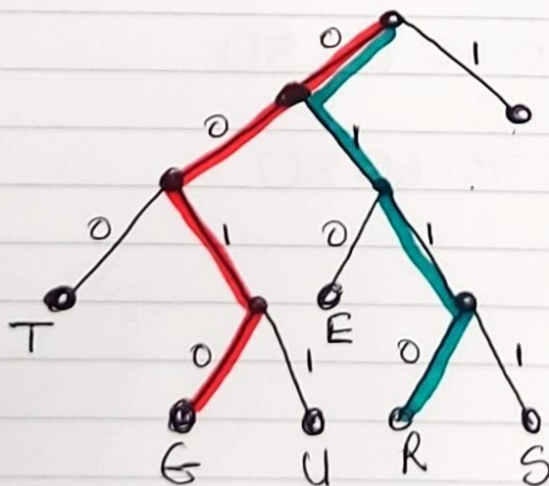
diagram over
page →



Question 8:

a) Decode: GRAPH THEORY IS FUN

e.g. G R A P H space
 00100110 11101011 11010111 100...



(Not the full diagram, see the tutorial sheet)

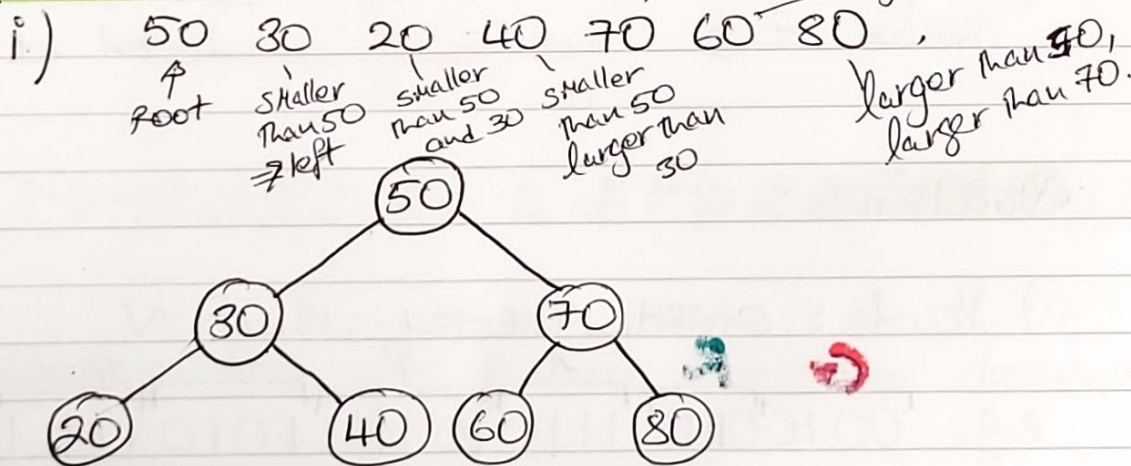
b) T O B E O R N O T T O B E

space ,

T	O	space	B	E	space	O	R	space
000	1101	1111	10110	010	1111	1101	0110	1111
N	O	T	space	T	O	space	B	E
1000	1101	000	1111	000	1101	1111	10110	010

can group the final encodings into eight bit strings for readability

Question 9:



ii) BFS: 50 30 70 20 40 60 80

DFS: 50 30 20 40 70 60 80