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Problem 1 solution

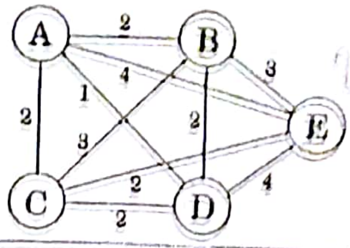
	0	1	2	3
A	0	∞	∞	7
B	∞	6	17	1
C	∞	∞	4	9
D	∞	8	∞	∞
E	∞	∞	1	12

The shortest path from A to E using 3 edges is A to D to B to E = 12 or using ~~at~~ no more than 3 edge is A to B to E which is 1 #

Scanned by CamScanner

Sect 6.6

TSP on Fig 6.9:



C:

$S \backslash j$	A	B	C	D	E
$\{A\}$	0	∞	∞	∞	∞
$\{A,B\}$	∞	2	∞	∞	∞
$\{A,C\}$	∞	∞	2	∞	∞
$\{A,D\}$	∞	∞	∞	1	∞
$\{A,E\}$	∞	∞	∞	∞	4
$\{A,B,C\}$	∞	5	5	∞	∞
$\{A,B,D\}$	∞	3	∞	4	∞
$\{A,B,E\}$	∞	7	∞	∞	5
$\{A,C,D\}$	∞	∞	3	4	∞
$\{A,C,E\}$	∞	∞	6	∞	4
$\{A,D,E\}$	∞	∞	∞	8	5
$\{A,B,C,D\}$	∞	6	6	7	∞
$\{A,B,C,E\}$	∞	7	7	∞	7
$\{A,B,D,E\}$	∞	8	∞	9	6
$\{A,C,D,E\}$	∞	∞	7	8	5
$\{A,B,C,D,E\}$	∞	8	8	9	8

$$C(S,j) = \min\{C(S-\{j\}, i) + d_{ij} : i \in S,\ i \neq j\}$$

$$C(\{A,B,C,D\}, B) = \min\{\, C(\{A,C,D\},A) + d_{AB} = \infty + 2 = \infty,\ C(\{A,C,D\},C) + d_{CB} = 3 + 3 = 6,\ C(\{A,C,D\},D) + d_{DB} = 4 + 2 = 6 \,\}$$

$= 6$

#2. The least cost tour of the graph is 10

Taking ~~minimum of~~ set {A, B, C, D, E} that ends at A, B, C, D, E.

B = 8, C = 8, E = 8, D = 9

Tracing back with B

hop hop

A ← B ← E ← C ← D ← A = 1 + 2 + 2 + 3 + 2 = 10

Tracing back with C

hop hop

A ← C ← E ← B ← D ← A = 1 + 2 + 3 + 2 + 2 = 10

Tracing back with E

hop

A ← E ← B ← C ← D ← A = 1 + 2 + 3 + 3 + 4 = 13

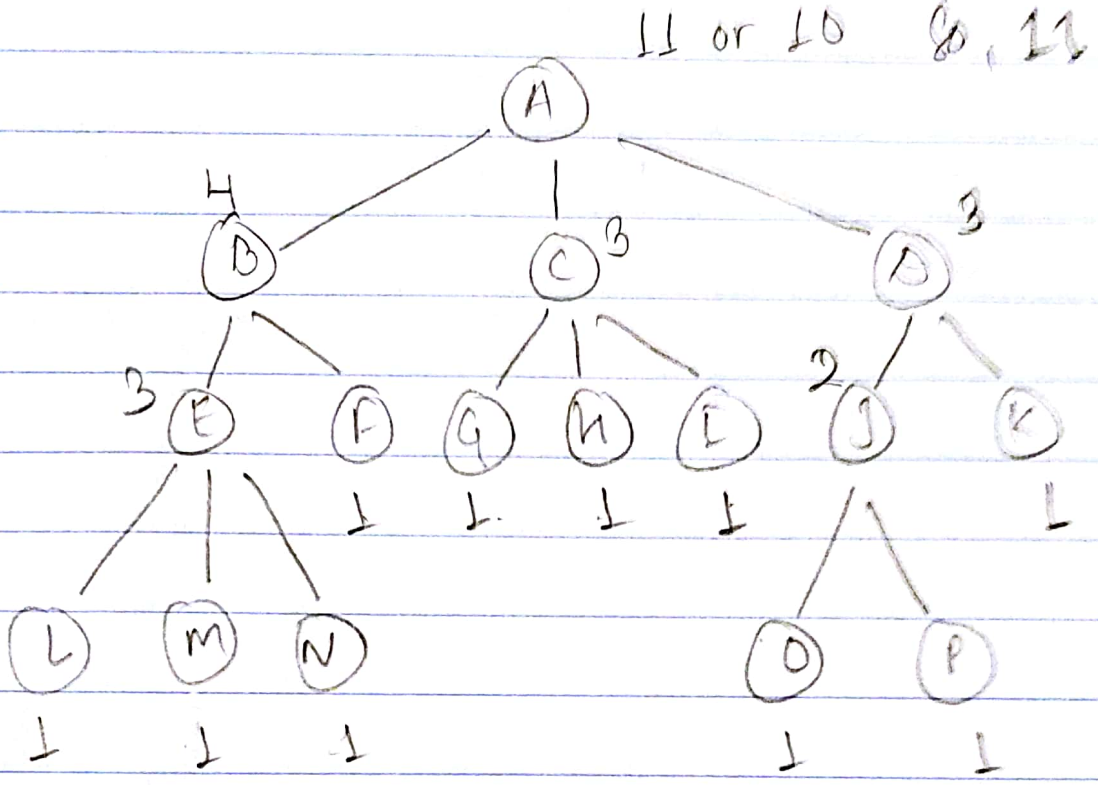
Tracking back with D : A ← D ← B ← E ← C ← A = 10

So on the of minimum tour path is ~~either~~.

A ← B ← E ← C ← D ← A ~~or~~

~~A ← E ← C ← D ← D ← A~~

Problem # 3.



The independent set found by the dynamic programming algorithm is

{~~A~~, L, M, N, F, G, H, I, O, P, K}

Problem # 4

$C(t, false) = 0$
$C(t, true) = 1$

$c(t, true) = 1 + \sum \{ \min(c(s, true), c(s. false)) : s, \text{is a children of } t \}$

$c(t, false = \sum \{ \max(c(s, true), c(s, false)) : s \text{ is a children of } t \}$

Problem # 5

$C(j, m) = true$ if $\sum \{ a_i : i \in S \} = m$.
for some $S \subseteq \{ i, \ldots, j \}$ and false otherwi

Base cases

$C(0, m) = false$ if m is not 0
$c(0,0) = true$
$C(j, m) = Q(j-1, m) \vee Q(j-1, m - a_j)$ if $n \geq a_j$
$c(j, m) = Q(j-1, m)$