

WORK BOOK-2

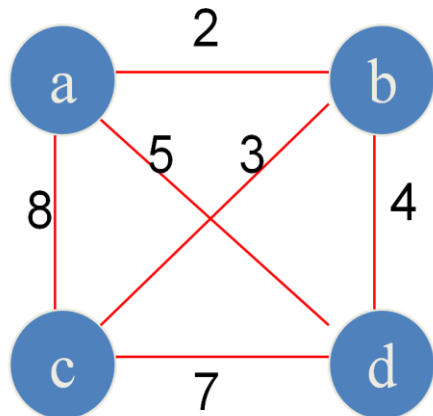
BRUTE FORCE:

1. Every pair of distinct points and return the indexes of the points for which the distance is the _____.
2. Efficiency _____.
3. Strengths _____.
4. Weaknesses _____.

ANS:

1. smallest
2. $\Theta(n^2)$
3. simplicity
4. unacceptably slow

EXHAUSTIVE SEARCH & TSP



ANS:

Tour	Cost
$a \rightarrow b \rightarrow c \rightarrow d \rightarrow a$	$2+3+7+5 = 17$
$a \rightarrow b \rightarrow d \rightarrow c \rightarrow a$	$2+4+7+8 = 21$
$a \rightarrow c \rightarrow b \rightarrow d \rightarrow a$	$8+3+4+5 = 20$
$a \rightarrow c \rightarrow d \rightarrow b \rightarrow a$	$8+7+4+2 = 21$
$a \rightarrow d \rightarrow b \rightarrow c \rightarrow a$	$5+4+3+8 = 20$
$a \rightarrow d \rightarrow c \rightarrow b \rightarrow a$	$5+7+3+2 = 17$

KNAPSACK PROBLEM:

Knapsack capacity $W=16$

<u>item</u>	<u>weight</u>	<u>value</u>
1	2	\$20
2	5	\$30
3	10	\$50
4	5	\$10

ANS:

<u>Subset</u>	<u>Total weight</u>	<u>Total value</u>
{1}	2	\$20
{2}	5	\$30
{3}	10	\$50
{4}	5	\$10
{1,2}	7	\$50
{1,3}	12	\$70
{1,4}	7	\$30
{2,3}	15	\$80
{2,4}	10	\$40
{3,4}	15	\$60
{1,2,3}	17	not feasible
{1,2,4}	12	\$60
{1,3,4}	17	not feasible
{2,3,4}	20	not feasible
{1,2,3,4}	22	not feasible

ASSIGNMENT PROBLEMS:

9 2 7 8

C= 6 4 3 7

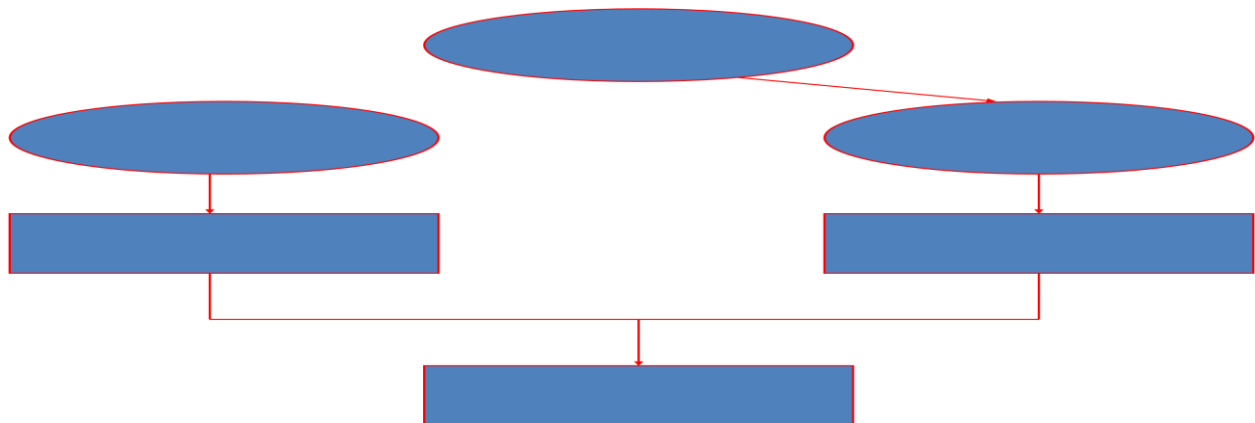
5 8 1 8

7 6 9 4

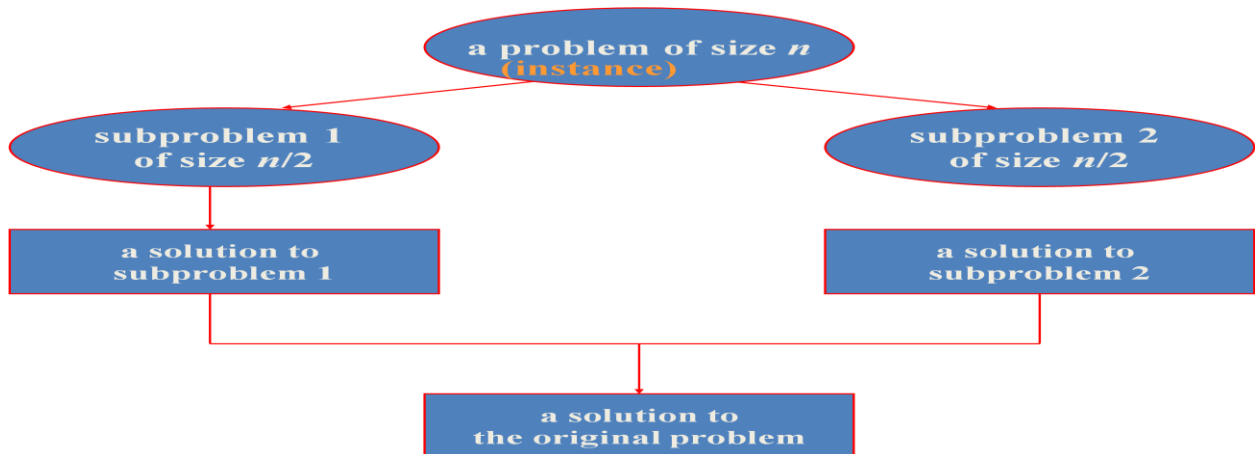
ANS:

<u>Assignment (col.#s)</u>	<u>Total Cost</u>
1, 2, 3, 4	$9+4+1+4=18$
1, 2, 4, 3	$9+4+8+9=30$
1, 3, 2, 4	$9+3+8+4=24$
1, 3, 4, 2	$9+3+8+6=26$
1, 4, 2, 3	$9+7+8+9=33$
1, 4, 3, 2	$9+7+1+6=23$

DIVIDE & CONQUER:



ANS:



QUICK SORT:

- b Best case: split in the middle _____
- b Worst case: sorted array! _____
- b Average case: random arrays _____

ANS: $\Theta(n \log n)$ $\Theta(n^2)$ $\Theta(n \log n)$ **BINARY SEARCH:**while $l \leq r$ do $m \leftarrow \lfloor (l+r)/2 \rfloor$ if $K = A[m]$ return m

else if ?

else $l \leftarrow m+1$

return -1

ANS: $K < A[m] \quad r \leftarrow m-1$ **MULTIPLICATION OF LARGE INTEGER:**Recurrence for the number of one-digit multiplications $M(n)$:Recurrence for the number of multiplications $M(n)$:

ANS:

n^2

$3 \log 2n$

STRASSEN'S MATRIX:

$$\begin{array}{cc} c_{00} & c_{01} \\ c_{10} & c_{11} \end{array} = \begin{array}{cc} a_{00} & a_{01} \\ a_{10} & a_{11} \end{array} * \begin{array}{cc} b_{00} & b_{01} \\ b_{10} & b_{11} \end{array}$$
$$= \begin{array}{cc} m_1 + m_4 - m_5 + m_7 & m_3 + m_5 \\ m_2 + m_4 & m_1 + m_3 - m_2 + m_6 \end{array}$$

ANS:

b $m_1 = (a_{00} + a_{11}) * (b_{00} + b_{11})$

b $m_2 = (a_{10} + a_{11}) * b_{00}$

b $m_3 = a_{00} * (b_{01} - b_{11})$

b $m_4 = a_{11} * (b_{10} - b_{00})$

b $m_5 = (a_{00} + a_{01}) * b_{11}$

b $m_6 = (a_{10} - a_{00}) * (b_{00} + b_{01})$

b $m_7 = (a_{01} - a_{11}) * (b_{10} + b_{11})$

CONVEX HULL:

- worst case _____
- average case _____
- Best case _____

ANS:

- $\Theta(n^2)$
- $\Theta(n)$
- $O(n \log n)$