1.

$D_1 = 2-6 = -4$

$D_2 = 6-3 = 3$

$g_{12} = D_1 + D_2 - 2c_{12}$

$= -1 - 2c_{12}$

$\because$ c_{12} is non-negative

$\therefore$ $g_{12} < 0$

交換 vertex1、verte 會使結果變好!

2.

D_1、D_n、D_{n+1}、D_{2n} 皆為0

$D_2 \sim D_{n-1}$、$D_{n+2} \sim D_{2n-1}$ 皆為 -1 ($E-I = 1-2$) +4

$c_{ij} = 1$ if $|i-j| = n$

$c_{ij} = 0$ if $|i-j| != n$

$g_{ij} = D_i + D_j - 2c_{ij}$

$\because$ $D_i + D_j \leq 0$ 且 $c_{ij} \geq 0$

$\therefore$ g_{ij} 必定 ≤ 0

因此經過一個pass之後

得到之最大partial sum 必 ≤ 0

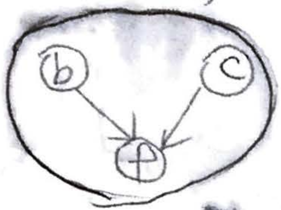
根據partitioning講義第14頁之虛擬碼

,結果不會做任何的swap!

3. $l(b)=1,\ l(c)=1,\ l(e)=3,\ l(g)=3$

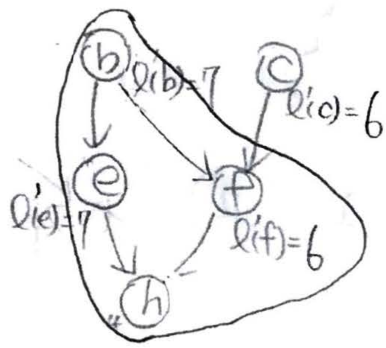
f:

cluster(f)



$$l(f) = \max\{l_1(f), l_2(f)\} = \max\{\max\{2,2\}, 0\} = 2 \#$$

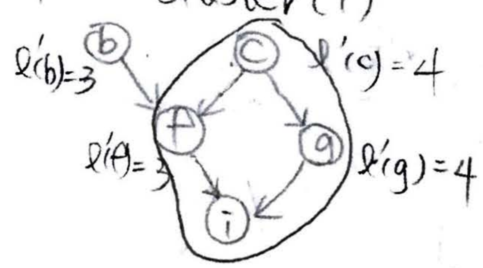
h: cluster(h)



$$l(h) = \max\{l_1(h), l_2(h)\} = \max\{\max\{7\}, \max\{6+5\}\} = \max\{7, 11\} = 11 \#$$

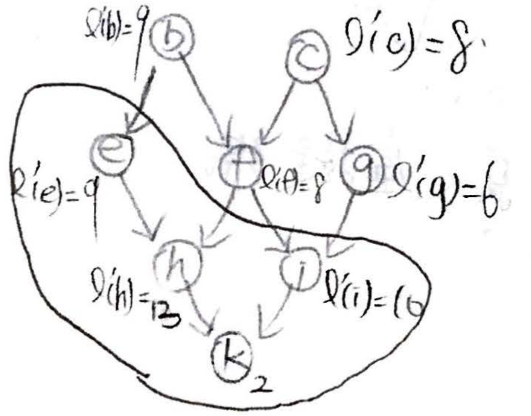
+15

i: cluster(i)



$$l(i) = \max\{l_1(i), l_2(i)\} = \max\{\max\{4\}, \max\{3+5\}\} = \max\{4, 8\} = 8 \#$$

k: cluster(k)



$$l(k) = \max\{l_1(k), l_2(k)\} = \max\{0, \max\{9+5, 8+5, 8+5, 6+3\}\} = \max\{0, 14\} = 14 \#$$

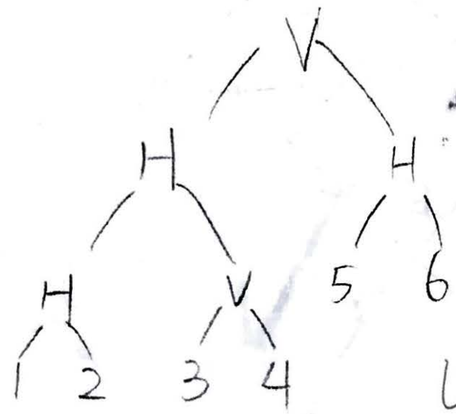
4.

(a) Yes! Since for every sub-expression $E_i = e_1 \cdots e_i$, $1 \le i \le 2n-1$

operands > # operators.

n = # operand

(b)

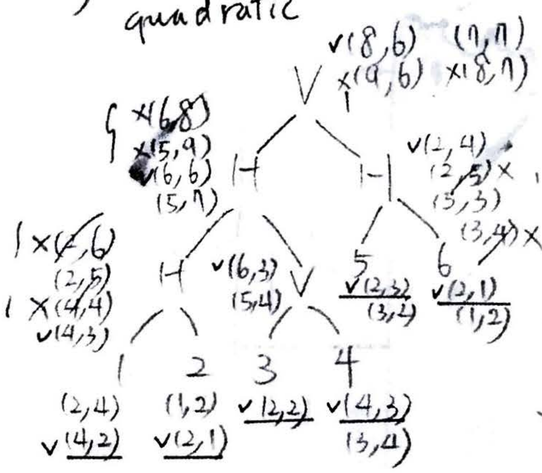


+3

Skewed! (沒有人的右子與自身相同)

(c) quadratic

+8.



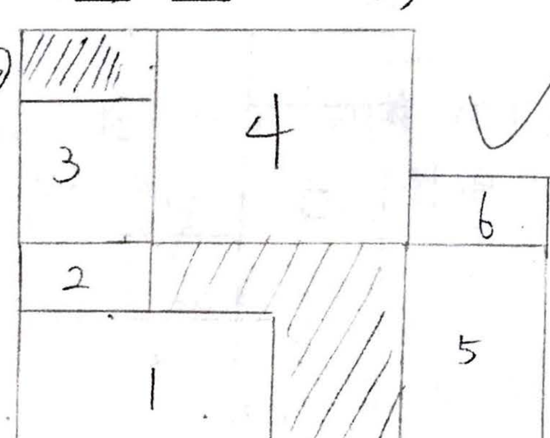
① Min area

$= 8 \times 6 = 48$ #

②

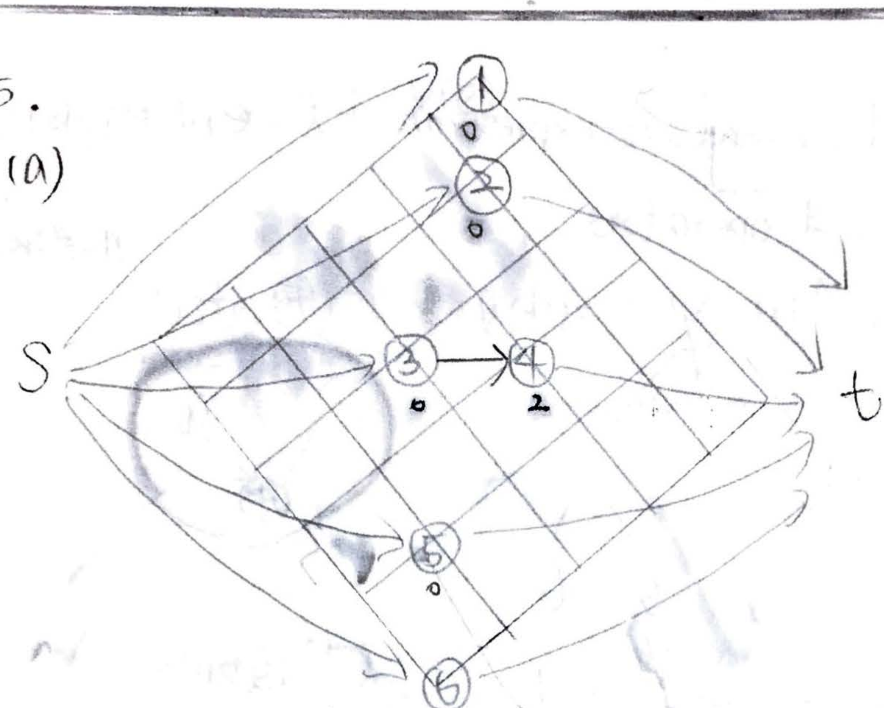
Module	width	Height
1	4	2
2	2	1
3	2	2
4	4	3
5	2	3
6	2	1

③

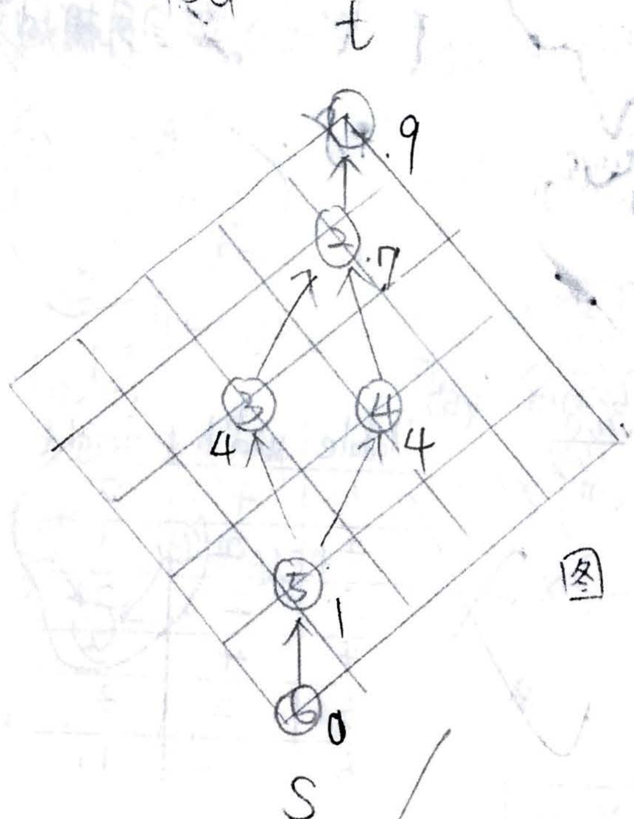


5.

(a)

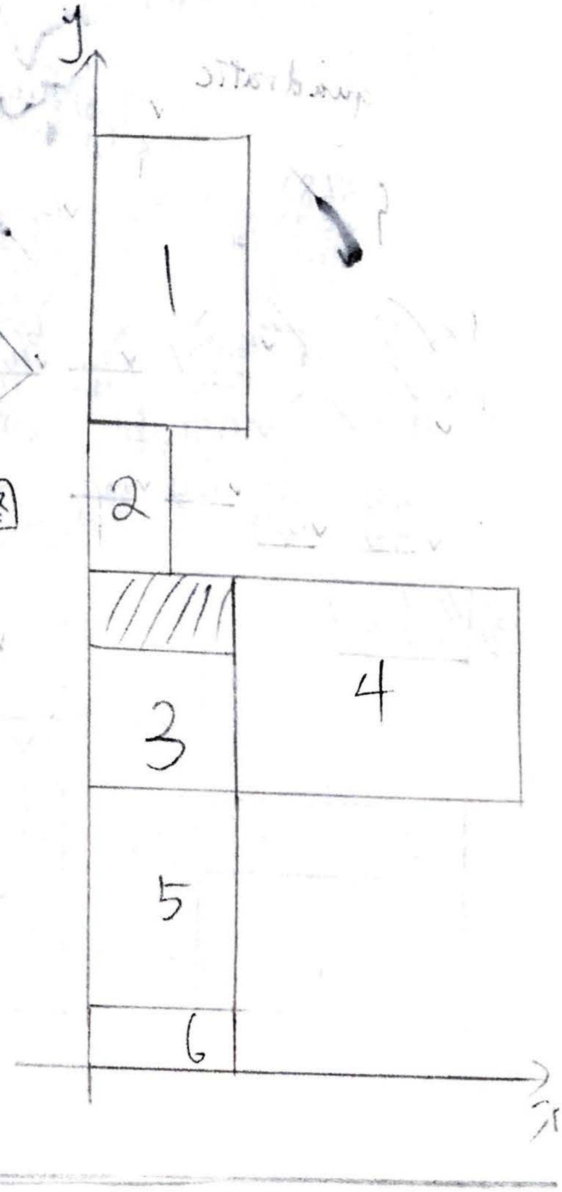


HCG



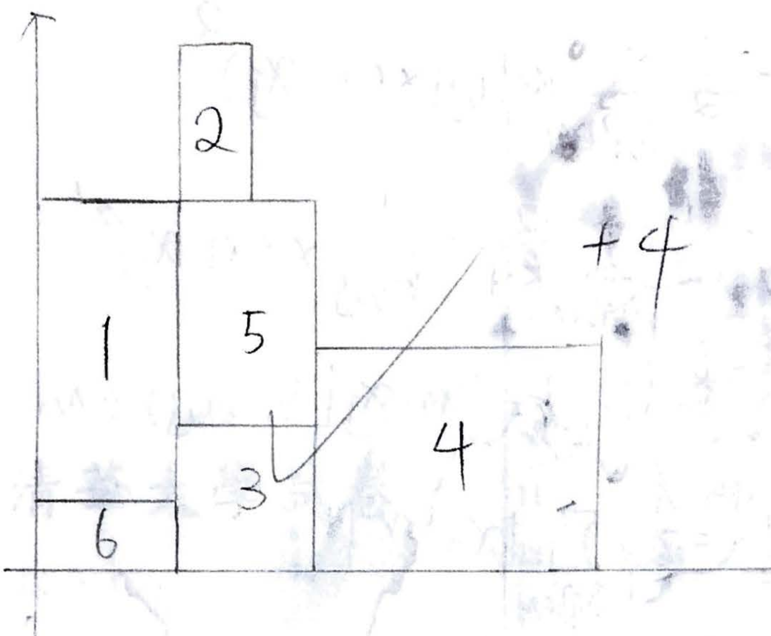
+9

图

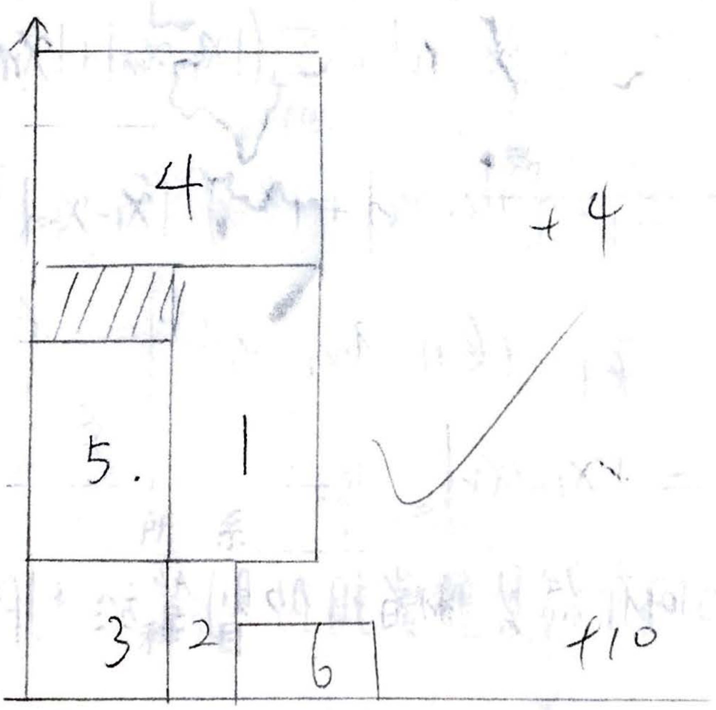


(b)

O-tree



(c)



6. 在一個包含所有pin的Bonding Box中，若欲建一個RSMT連接所有pin，最理想之情形為任一X或Y座標，只會被此RSMT中的一線段經過，不可有第二個線段經過之，在此情形下將水平及垂直方向之所有線段長相加，可分別得到(Max of X − RSMT上 Min of X)及(Max of Y − Min of Y)，兩者相加為HPWL，故HPWL為RSMT線長之lower bound!

7、 $$L^{\sim BB} = \frac{1}{2} \sum_{\{i,j\} \in N} w\{i,j\} \times (x_i - x_j)^2$$

$$= \frac{1}{2} \sum_{\{i,j\} \in N} \frac{2}{k-1} \times \frac{1}{l\{i,j\}} \times (x_i - x_j)^2$$

if $l\{i,j\} = |x_i - x_j| \ \forall \ \{i,j\} \in N$

$$\Rightarrow L^{\sim BB} = \frac{1}{k-1} \sum_{\{i,j\} \in N} |x_i - x_j|$$

$$= \frac{1}{k-1} \left\{ |x_1 - x_k| + \sum_{2 \le m \le k-1} \left(|x_1 - x_m| + |x_m - x_k| \right) \right\}$$

$$= \frac{1}{k-1} \cdot \left\{ |x_1 - x_k| + (k-2) \cdot |x_1 - x_k| \right\}$$

$$= \frac{1}{k-1} \cdot (k-1) \cdot |x_1 - x_k|$$

$$= |x_1 - x_k| \#$$

y 方向亦然!! 兩者相加則等於 HPWL!!

410

8.

7	6	7					
6	5	6	7				
5	4	5	6	T 7			
4	3						
3	2						6
2	1	S	1	2	3	4	5
3	2	1	2	3	4	5	6
4	3	2	3	4	5	6	7

+3

9、將lee-alogrithm之水波擴散方向改成8個，往斜方行進之格子標記為現有步數加上$\sqrt{2}$，若欲標記之格子已被標記則不標記之 (同lee alg)

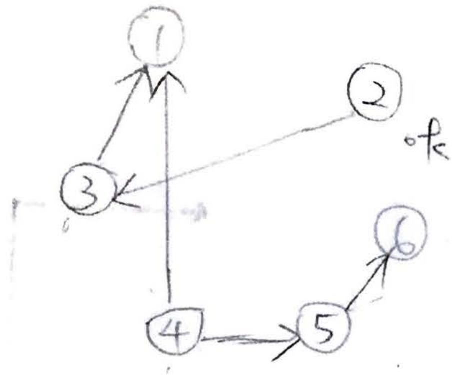
每次從標記最小的點向外擴

+9

，backtrace之方向改為"從終點開始找，每次皆從八個方向找到小於自身標記步數之格子中的最小值做為backtrace之方向。

10.

(a) VCG



箭頭反了

+2

(b) Track 1: $I_4[4,7]$

Track 2: $I_5[3,7]$

Track 3: $I_6[1,3]$、$I_2[5,6]$

Track 4: $I_3[2,6]$

Track 5: $I_1[2,4]$

+7