1) a)
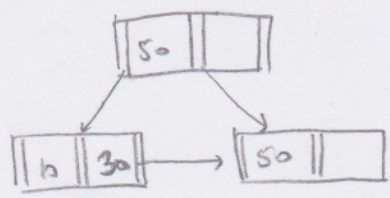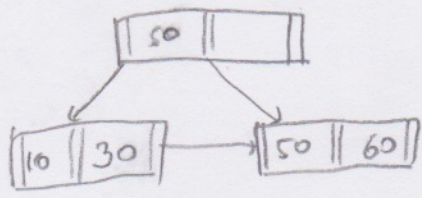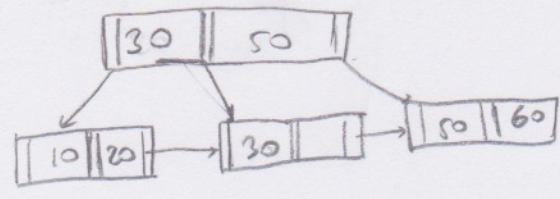

b)
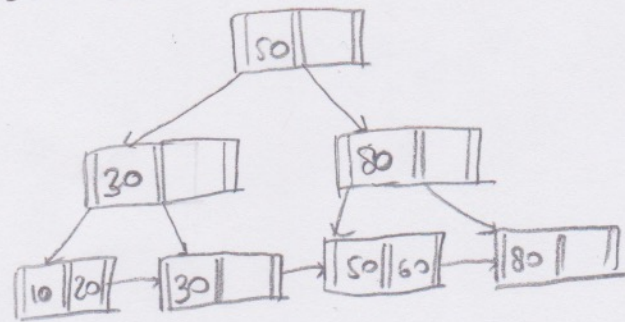

Insert 60:

Insert 20:
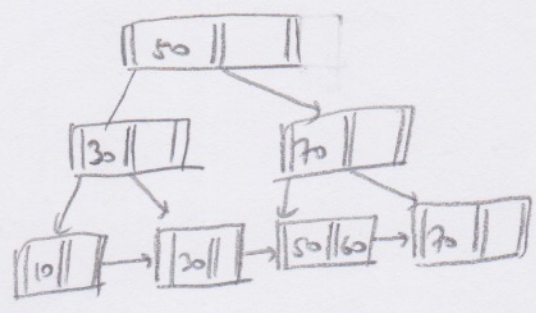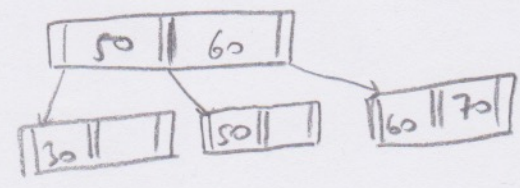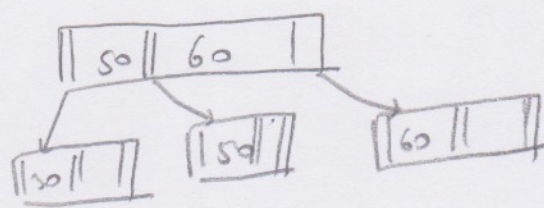
Insert 80:

delete 20:

delete 10:

delete 70:

2)

1 - 4 records

2 - $5(4) = 20$ records

3 - $5(5)(4) = 100$ records
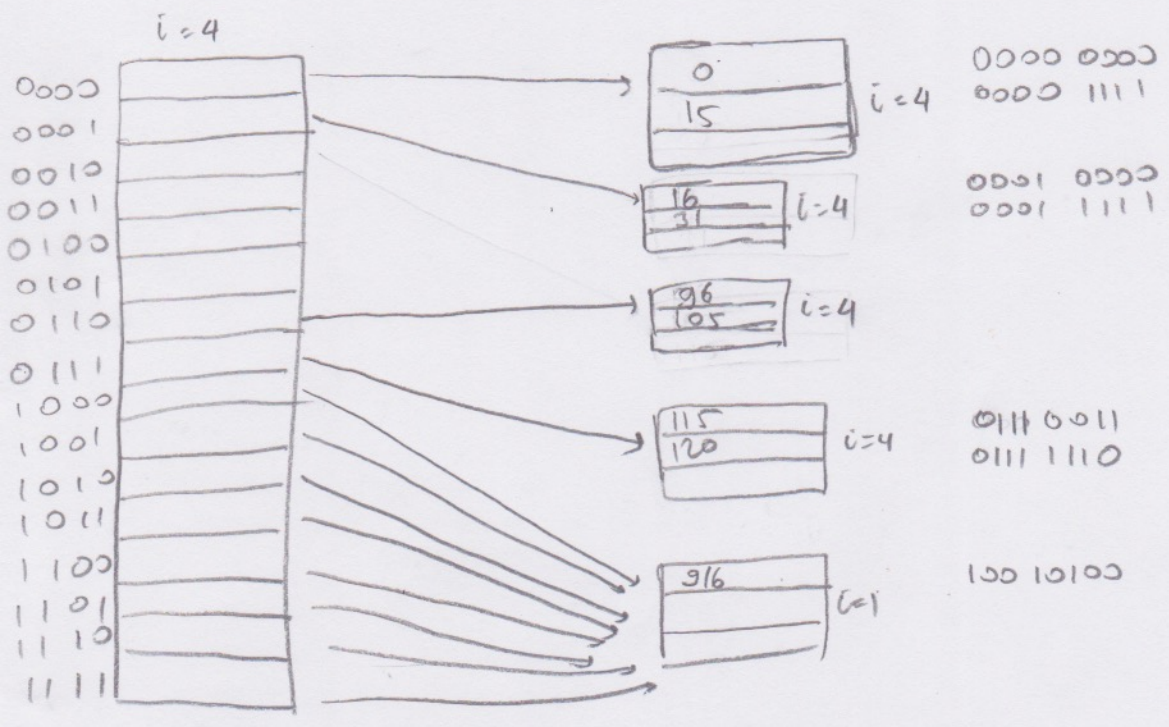
4 - $5(5)(5)(4) = 500$ records

Min = 4 levels

1 -	2 records	1
2 -	6 records	3
3 -	18 records	9
4 -	54 records	27
5 -	162 records	81
6 -	486 records	243

Max = 5 levels

3)

$M(106) = 106 = 0110 1010$.

$M(115) = 115 = 0111 0011$.

$M(916) = 148 = 1001 0100$

$M(0) = 0 = 0000 0000$.

$M(96) = 96 = 0110 0000$.

$M(126) = 126 = 0111 1110$.

$M(16) = 16 = 0001 0000$.

$M(15) = 15 = 0000 1111$.

$M(31) = 31 = 0001 1111$

'0' = 8

'00' : 4

'000' : 4

'0000' : 2

'1001' : 2

'0110' : 2

'0111' : 2

'1001' : 1

i = 4

0000
0001
0010
0011
0100
0101
0110
0111
1000
1001
1010
1011
1100
1101
1110
1111

0 / 15   i=4   0000 0000 / 0000 1111

16 / 31   i=4   0001 0000 / 0001 1111

96 / 105   i=4

115 / 120   i=4   0110 0011 / 0111 1110

916   i=1   1001 0100

4)a) $\underline{R}$ = 10 + 10 = 20 bytes

20 bytes × 5000 = 100 000 bytes

100.000 × $\dfrac{1\ block}{1000\ bytes}$ = 100 blocks

$\underline{S}$ = 10 + 180 = 190 bytes

190 bytes × 500 = 95000 bytes

95000 × $\dfrac{1\ block}{1000\ bytes}$ = 95 blocks

b) $10n + 10(n-1) <= 1000$

  ↓   ↓
 size pointer

$20n <= 1010$

$n <= 50.5$

$n = 50$