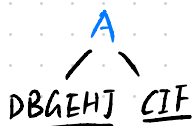
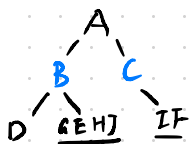


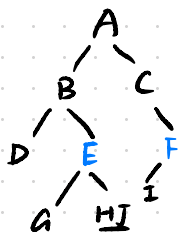
4 ①



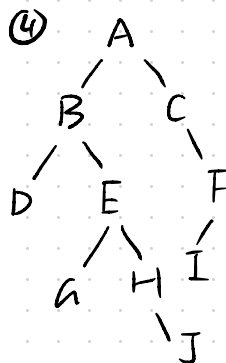
②



③



④



7. 设一棵满二叉树有 n 层.

则节点数 $N = 1 + 2 + \dots + 2^{n-1} = 2^n - 1$

$$V(N) = V(2^0 + 2^1 + \dots + 2^{n-1}) \\ = V(\underbrace{1111 \dots 11}_{n \text{ 个}}) = n$$

节点高度和

$$S = 1 \times (n-1) + 2 \times (n-2) + \dots + 2^{n-1} (n-n)$$

$$2S = 2 \times (n-1) + 4 \times (n-2) + \dots + 2^n (n-n)$$

$$\Rightarrow S = -(n-1) + 2 + 4 + \dots + 2^{n-1} = 2^n - 1 - n$$

易得 $S = 2^n - 1 - n = N - V(N)$ 得证

8 对一棵树考虑. 除了根结点外. 每增加一个结点, 对度产生 2 的贡献

$$BP \leq d = 2n - 2$$

10 A _ CDE _ GHIJ K

CB _ _ FAHJKIG

C E F D B K J I H G A

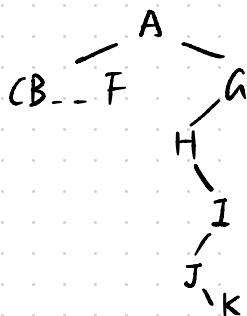
① A 为根结点



② H 在右子树

根据前. 中序

确定右子树



③ 根据中. 后序
确定左子树

