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Homework 16.1

Ans ⇒

- 15 : 00001111
- −15 : 11110000 + 1 = 11110001
- 16 : 00010000
- −16 : 11101111 + 1 = 11110000
- 33 : 00100001
- −33 : 110 11110 + 1 = 11011111
- 127 : 0111 1111
- 29 : 00011101
- −1 : 11111110 + 1 = 11111111

Homework 16.2

Ans ⇒ a) $T(n, min, max) = T(i, min, mid) + T(n-i, mid+1, max) + O(n)$

$T(n, min, max) = T(i, min, mid) + T(n-i, min, mid) + O(n)$ [because $mid = \frac{min+max}{2}$]

b) In worst case $min = 0$, $max = 2^{b+1} - 1$
$mid = 2^b - 1$

$T(n, b) = T(n, 0, 2^{b+1} - 1) = T(i, 0, 2^b - 1) + T(n-i, 0, 2^{b-1}) + O(n)$

Assume that $T(n, 0, 2^{b+1} - 1) = nb$ [Proof by guess]

$\Rightarrow T(n, b) = i(b-1) + (n-i)(b-1) + n$
$= n(b-1) + n$
$= nb$.

Hence $T(n, b) = nb$

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Homework 16.3

Ans-16 → a) Minimum leaves has to be $n!$

Reason

As discussed in ~~Dr.~~ lecture by Dr. Naveen Garg, each permutation of decisions will lead to a permutation which corresponds to a unique leaf.

~~Here~~ Hence, there is one-to-one mapping on minimum number of leaves and total permutations.

b) for maximum also, as Dr. Naveen said, we look at the permutations.

Also, one-to-one mapping indicates there is a unique value i.e $n!$ and thus maximum number of leaves are also $n!$