Problem 1 solve: Tower of recurrence

Given that,

T₀ = 0

Tn = 2 Tn-1  + 1, For n>0

Now

Tn/ 2n =(Tn-1 /2n-1.2) + 1/2n

Or, Tn/2n = (Tn-1 /2n-1) + T-n

Or, Sn = Sn-1 + 2-n

Or, Sn = T-k

Now, close from eqn

2-1+2-2+ …………….. +2-n= 1- (1/2)n

Or, Sn = T-k

Or, Sn = 1- (1/2)n

Or, Tn = 2n (1- (1/2)n)

=2n-1, for n>0

[Proved]