1. Order the following five functions in increasing order (where log is taken base 2):

1.001^n, $n^{0.001n}$, $4^{\log n}$, $n!$, $\log(n!)$ **(20%)**

2. Write the algorithm to the quick sort and analysis the time complexity of quick sort in the worst case and best case. **(20%)**

3. Fibonacci number **(20%)**

$F_0 = 0$, $F_1 = 1$, and $F_n = F_{n-1} + F_{n-2}$ for every $n \geq 2$,

Please solve the recurrence equation for F_n

4. How many different binary trees are there with n nodes? and why? **(20%)**

5. What is the time complexity of T(n) defined below? **(20%)**
If n=2 then T(n)=1 else
If n>2 then T(n)= T(n/2)+logn