H3

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1.) $n! = n(n-1)\cdots(\lceil n/2 \rceil)(\lceil n/2 \rceil)\cdots 4\cdot 3\cdot 2\cdot 1$

$= [n(n-1)\cdots(\lceil n/2 \rceil)][(\lceil n/2 \rceil)\cdots 2\cdot 2\cdot 3\cdot 2\cdot 1]$

$\geq \underbrace{\left[\frac{n}{2}\cdots\frac{n}{2}\right]}_{\lceil n/2 \rceil \text{ terms}}\underbrace{[2\cdots 2]}_{\lceil n/2 \rceil \text{ terms}}$

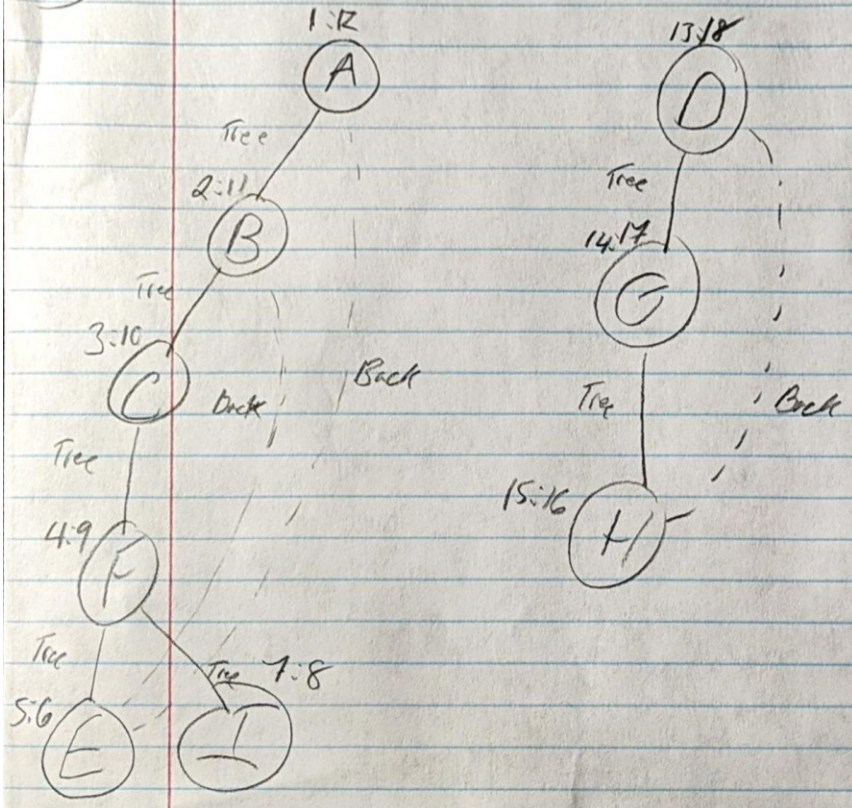
$= [n\cdots n]$

$= n^{n/2}$

2. we must swap array values so that the pivot point can become the median of the array. We take lower values and shift it to the beginning of the array. Then taking the number that equals v and shift them to the end of the numbers that are greater than v. The pseudo code below should split the array.

```
split(S, v)
    ...
    padd = 0;
    for (i in S; i < S.length) {
        if (S[i] < v) {
            swap S[i] for S[padd]
            padd
        }
    }
    for (i in S; i < S.length) {
        if (S[i] = v) {
            swap S[i] for S[padd]
            padd++;
        }
    }
```

3)


1:12
A
Tree
2:11
B
Tree
3:10
C
Back
Back
Tree
4:9
F
Tree
5:6
E
Tree
7:8
I
13:18
D
Tree
14:17
G
Tree
Back
15:16
H