

University of Waterloo
CS240, CS240E Winter 2022
Tutorial 00 Solutions

1 Mathematics

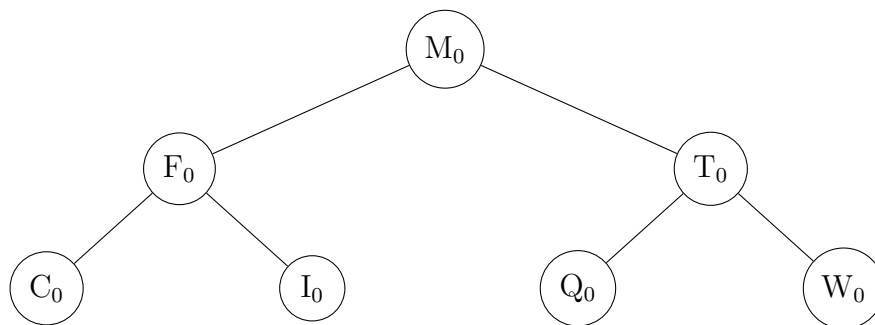
Write a proof showing that $\log(n!) \in O(n \log n)$.

$$\begin{aligned}\log(n!) &= \log\left(\prod_{i=1}^n i\right) \\ &= \sum_{i=1}^n \log(i) \\ &\leq \sum_{i=1}^n \log(n) \\ &= n \log n\end{aligned}$$

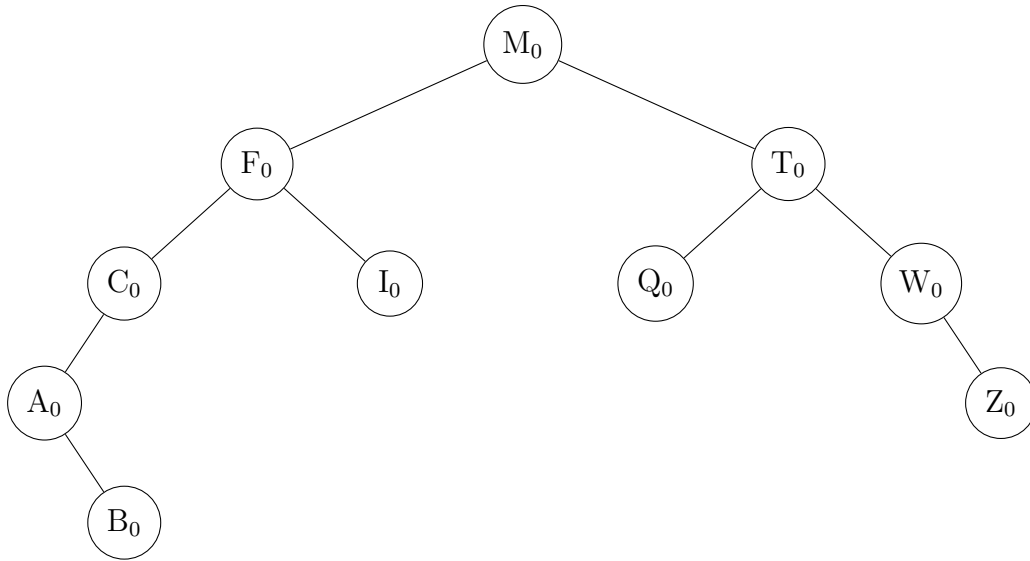
Choosing $c = 1$ and $n_0 = 1$, we have $\log(n!) \in O(n \log n)$.

2 Trees

We will add the letters Z, A, and B to the BST below.



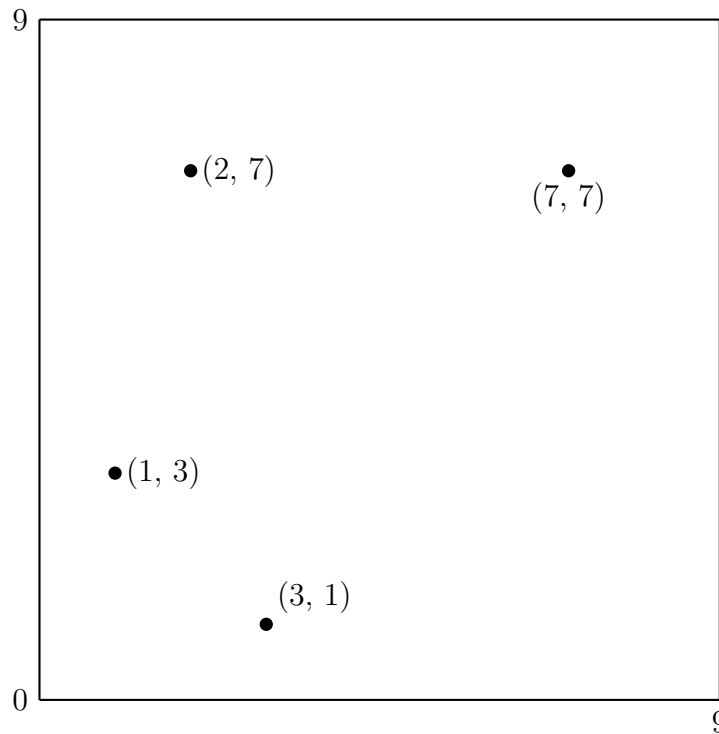
Hint: For nodes with only one child, you may wish to use “child[missing]” for the non-existent child.



3 Plots

Plot the following points below. Only show the resulting plot.

Points: $(2,7)$, $(1,3)$, $(3,1)$, $(7,7)$



4 Latex Resources

L^AT_EX Editors

- a) TeX Live: <https://www.tug.org/texlive/>
- b) TeXstudio: <https://www.texstudio.org/>
- c) Overleaf: <https://www.overleaf.com/>
- d) pdflatex: on the student environment

Miscellaneous Resources

- <http://detexify.kirelabs.org/classify.html>
- https://oeis.org/wiki/List_of_LaTeX_mathematical_symbols
- <https://en.wikibooks.org/wiki/LaTeX>
- <https://tex.stackexchange.com/>