University of Waterloo
CS240, Fall 2020
Tutorial 00

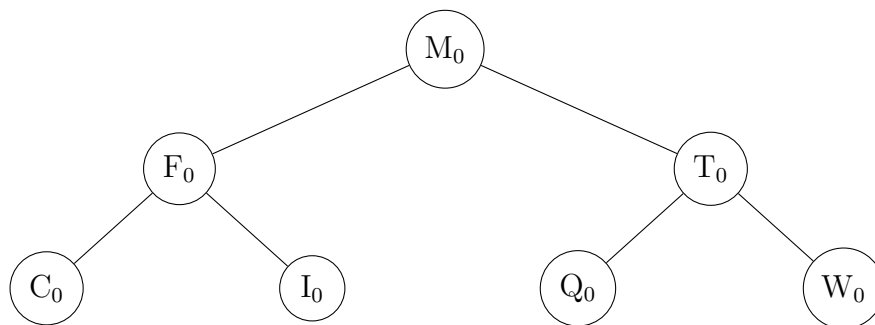## 1 Mathematics

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

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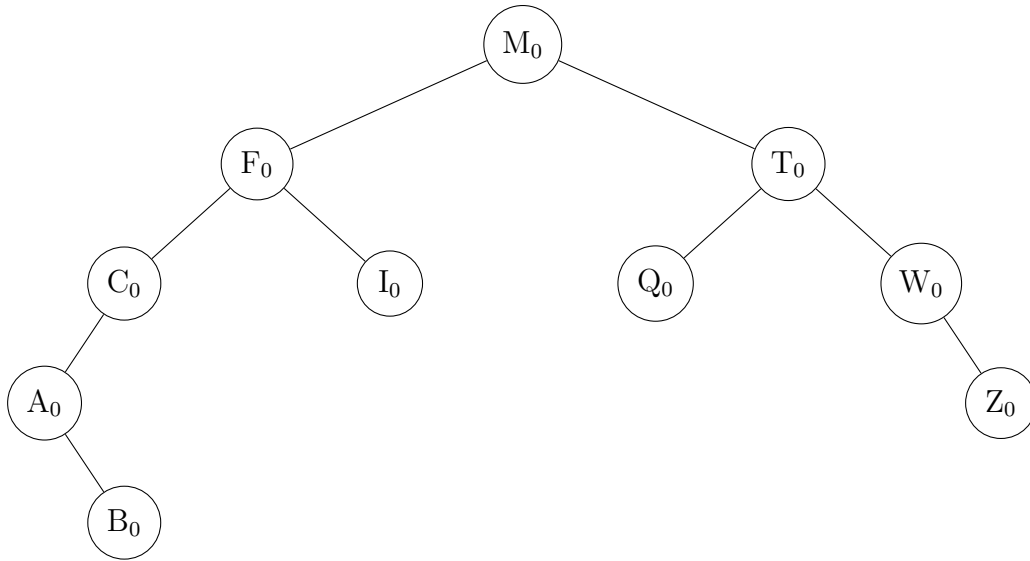$$\leq \sum_{i=1}^{n} \log(n)$$
$$= n \log n$$

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 tree below.

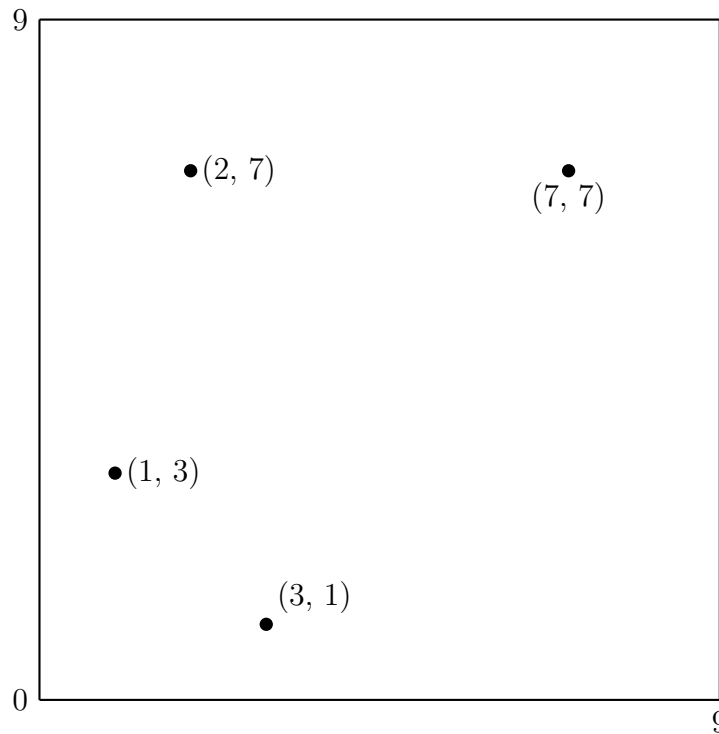*Hint: For nodes with only one child, you may wish to use "child[missing]" for the non-existent child.*

M$_0$

F$_0$ T$_0$

C$_0$ I$_0$ Q$_0$ W$_0$

A$_0$ Z$_0$

B$_0$

3   Plots

Plot the following points below. Only show the resulting plot.
Points: (2,7), (1,3), (3,1), (7,7)

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•(2, 7)   •
                (7, 7)

•(1, 3)

(3, 1)
•

0

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4 Latex Resources

LaTeX 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/`