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.

\[ Hint: \text{For nodes with only one child, you may wish to use “child[missing]” for the non-existent child.} \]
### 3 Plots

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

\TeX 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/