

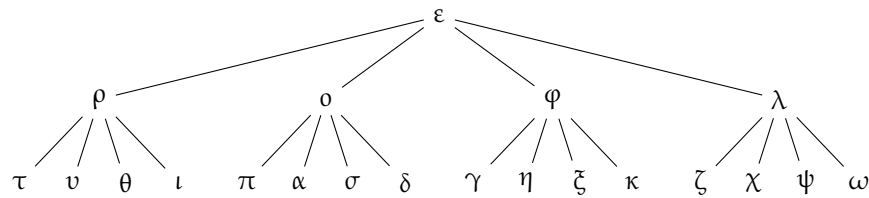
MAU22C00 Assignment 2, Due Friday 13 October 2023

1. In the following expressions, which variables are free and which are bound?

- (a) $\{[\exists x.(fx)] \supset [\exists y.(fy)]\}$
- (b) $\{[\forall x.(fx)] \supset (fy)\}$
- (c) $\{[(fx) \supset (gx)] \supset \{[(gx) \supset (hx)] \supset [(fx) \supset (hx)]\}\}$

2. For the following tree, indicate the order in which the nodes are traversed

- (a) in a depth first traversal?
- (b) in a breadth first traversal?
- (c) in the hybrid traversal discussed in lecture?



3. Give a tableau to show that the statement $\{[\exists x.(fx)] \supset [\exists y.(fy)]\}$ is valid.

4. Give a formal proof of the statement $\{[\exists x.(fx)] \supset [\exists y.(fy)]\}$.

Hint: The statement is an implication. All the proofs of implications I've given in lecture start and end in the same way and this one is no exception. You have a rule of inference which eliminates existential quantifiers and another which introduces them. You want to use those rules in that order. If your proof is more than half a dozen lines long then it is unnecessarily complicated.