

Tutorial 4

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1. Rewrite the following terms using the conventions (i.e. remove unnecessary parentheses, etc.).

- $((x)(y))$
- $(\lambda x.(z))$
- $((xz)(yz))$
- $(\lambda x.(\lambda y.(yx)))$
- $(\lambda x.(\lambda y.x))$
- $(\lambda x.(xx))$

2. Identify the free variables and the bound variables in the following terms.

- y
- $\lambda y.x$
- $\lambda xy.x$
- $\lambda x.(\lambda y.z)y$

3. Reduce the following terms to normal form, where: $K = \lambda xy.x$, $I = \lambda x.x$.

- $y.(x.x)y$
- $y.y(x.x)$
- II
- KI
- KKK

4. **Challenge:** What is the purpose of the following term?

