

CSC 201 Homework 2

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Problem 1

- (a) $(\lambda y. \lambda x. x(y))(x) \rightarrow_{\alpha\text{-conversion}} (\lambda y. \lambda z. z(y))(x) \rightarrow_{\beta\text{-conversion}} \lambda z. z(x).$
- (b) $(\lambda x. \lambda y. x(\lambda x. x(y)))(\lambda x. \lambda y. y(x)) \rightarrow_{\alpha\text{-conversion}} (\lambda x. \lambda z. x(\lambda x. x(z)))(\lambda x. \lambda y. y(x)) \rightarrow_{\beta\text{-conversion}} (\lambda z. \lambda x. \lambda y. y(x)(\lambda x. x(z))) \rightarrow_{\beta\text{-conversion}} \lambda z. \lambda y. y(\lambda x. x(z)).$
- (c) $\frac{(\lambda w. (\lambda w. w(y))w)(\lambda z. \lambda y. z(y)) \rightarrow_{\beta\text{-conversion}} (\lambda w. w(y))(\lambda z. \lambda y. z(y)) \rightarrow_{\alpha\text{-conversion}} (\lambda w. w(y))(\lambda z. \lambda x. z(x)) \rightarrow_{\beta\text{-conversion}} (\lambda z. \lambda x. z(x))(y) \rightarrow_{\beta\text{-conversion}} \lambda x. y(x)}$

Problem 2

$$\underline{\underline{((\lambda a. \lambda b. (\lambda g. g(\lambda x. x(a)))(b))(y))(\lambda c. \lambda y. c(y))}}$$