

Quiz 4 from Fall 2021

STUDENT NAME

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Q1 Explicit Parentheses

5 Points

Make the parentheses in the following lambda expressions explicit:

$\lambda x. x y \lambda y. y y z$

Note: You may use λ , \backslash , or L to denote the lambda symbol.

Enter your answer here

Save Answer

Q2 Alpha Conversion

2 Points

Select the valid alpha conversions of the following lambda expression:

$(\lambda x. x (\lambda a. x a b)) y$

$(\lambda x. x (\lambda a. x a z)) c$

$(\lambda x. x (\lambda c. x c b)) y$

$(\lambda c. c (\lambda w. c w b)) y$

$(\lambda w. w (\lambda a. x a b)) y$

Save Answer

Q3 Free Variables

2 Points

Select the following lambda expressions that **contain** free variables.

$(\lambda b. a (\lambda a. a) b)$

$(\lambda c. (\lambda b. c (\lambda a. b))) (\lambda a. a)$

$\lambda a. \lambda b. a (\lambda a. b) b$

$(\lambda c. \lambda b. c \lambda b. a \lambda a. a) (\lambda b. b)$

Save Answer

Q4 β -Reduction

5 Points

Solve the following beta reductions. Show all steps with **explicit parentheses** to receive full points.

$(\lambda a. a) ((\lambda x. \lambda y. x y) (\lambda b. b) (\lambda c. c))$

Note: You may use λ , \backslash , or L to denote the lambda symbol.

Enter your answer here

Save Answer

Q5 Call-by-Name versus Call-by-Value

6 Points

Recall the reduction strategies call-by-name and call-by-value. Reduce the following lambda expression using the two strategies.

$(\lambda a. \lambda b. b) ((\lambda c. c) (\lambda d. d))$

Note: You may use λ , \backslash , or L to denote the lambda symbol.

Q5.1 Call-by-Name

3 Points

Show the β -Reduction of the expression $(\lambda a. \lambda b. b) ((\lambda c. c) (\lambda d. d))$ using **call-by-name**. Show all steps with **explicit parentheses** for full credit.

Enter your answer here

Save Answer

Save Answer

Q5.2 Call-by-Value

3 Points

Show the β -Reduction of the expression $(\lambda a. \lambda b. b) ((\lambda c. c) (\lambda d. d))$ using **call-by-value**. Show all steps with **explicit parentheses** for full credit.

Enter your answer here

Save Answer

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