

## Quiz 4 from Fall 2020 (Practice)

STUDENT NAME

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### Q1 Explicit Parentheses

5 Points

Make the parentheses in the following lambda expression explicit:

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

You may use  $\backslash$  to denote the lambda symbol.

Enter your answer here

Save Answer

### Q2 Single Beta Reduction

5 Points

Which of the following expressions can result from a single (one step) beta reduction of the following lambda expression? You may choose multiple.

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

$(\lambda y.x) z$

$z (\lambda y.x)$

$(\lambda x.x) x$

$(\lambda x.x) z$

Save Answer

### Q3 Beta Reduction

5 Points

Reduce the following expression

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

You may use  $\lambda$  to denote the lambda symbol.

Enter your answer here

Save Answer

## Q4 Lambda Encodings

5 Points

What is the lambda calculus encoding of `nor x y`?

```
nor true true = false
nor true false = false
nor false true = false
nor false false = true
```

You may use  $\lambda$  to denote the lambda symbol.

Enter your answer here

Save Answer

Save All Answers

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