

Problem [15 marks]

- (i) (3 marks) Recall that Boolean constants *true* and *false* are defined as: $T = (\lambda xy \mid x)$ and $F = (\lambda xy \mid y)$, respectively. Simplify the following expression. Show all the steps.

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- (ii) (6 marks) Evaluate the following lambda expression

`((lambda (x y) (y x)) 3 (lambda (x) (+ x z)))`

by the context-based interpreter. Assume this expression is a sub-expression in a more complex expression, and when this sub-expression is evaluated it's evaluated in the context $CT0 = \{z \rightarrow 3\}$.

- (a) What is the context when `(y x)` is evaluated?
(b) What is the context when `(+ x z)` is evaluated?

- (iii) (6 marks) Compile the following lambda expression to SECD code.

`(lambda (x) (+ x 2)) ((lambda (y) (* y y)) 3)`