CSMM: Lesson 1.1 HW

Jake Peck

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For the following questions, use these function definitions:

$$I := \lambda x.x$$

$$\omega := \lambda x.xx$$

$$\Omega := \omega\omega$$

$$T := \lambda xy.x$$

$$F := \lambda xy.y$$

$$O := \lambda sz.sz$$

$$W := \lambda sz.s(sz)$$

$$S := \lambda wyx.y(wyx)$$

$$P := \lambda abf.fab$$

(1-7) For each of the following,
(a) Find the normal form for the expression if it exists. If it does not, state so.
(b) If an answer to part (a) was found, write the Curried version of that answer.

1. Ia
2. ωF
3. Ωy
4. TTF
5. TFT
6. SF
7. SO

8. In English, what do you think S does?

ANSWERS

1. a, a
2. I, $\lambda y.y$
3. No normal form
4. T, $\lambda x.\lambda y.x$
5. F, $\lambda x.\lambda y.y$
6. O, $\lambda s.\lambda z.sz$
7. W, $\lambda s.\lambda z.s(sz)$
8. S prepends another of the first variable that a function takes to the body of the mapping.