LAMBDA CALCULUS WEEK 1

Ben Kerr

EXERCISE 1:

$$(((\lambda f.\lambda x.ffff(x)))(\lambda g.\lambda y.g(g(y))))\ldots$$

APPLY 3 (APPLY 2)

I FIRST NESTED APPLY 2 IN APPLY 3 SO,

(APPLY TWICE, APPLY TWICE, APPLY TWICE)

THEN THE APPLY TWICE TAKES ANOTHER FUNCTION, $Z+1$, SO,

$(+1, +1, +1, +1, +1, +1)\ 0$

INSERTING THE 0, GIVES US (6)

EXERCISE 2: $\omega(\omega) = \lambda x = x(x)(x(x))$

EXERCISE 3:

(i) $\lambda xyz.xzyz$

(ii) $abcdefgh$

(iii) $(\lambda xy.yx(\lambda v.v)z)u)\lambda w.w$

b)

(i) $(((xx)x)x)$

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

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

KER COMP PRACTICE

1a) i) TERM WITH PARENTHESIS UNNECESSARILY REMOVED

ii) NOT A TERM

iii) TERM

iv) TERM

v) TERM

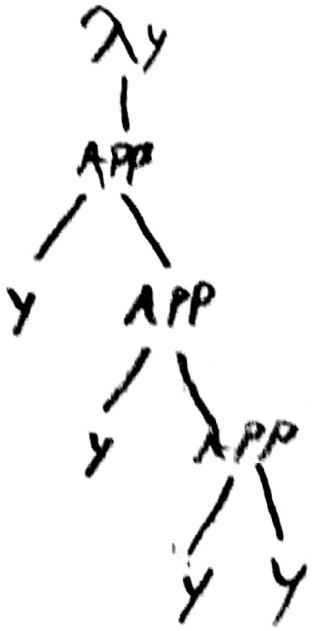
1b) i) $\lambda xyz.z(xy)$

ii) $\lambda y.yyyy$

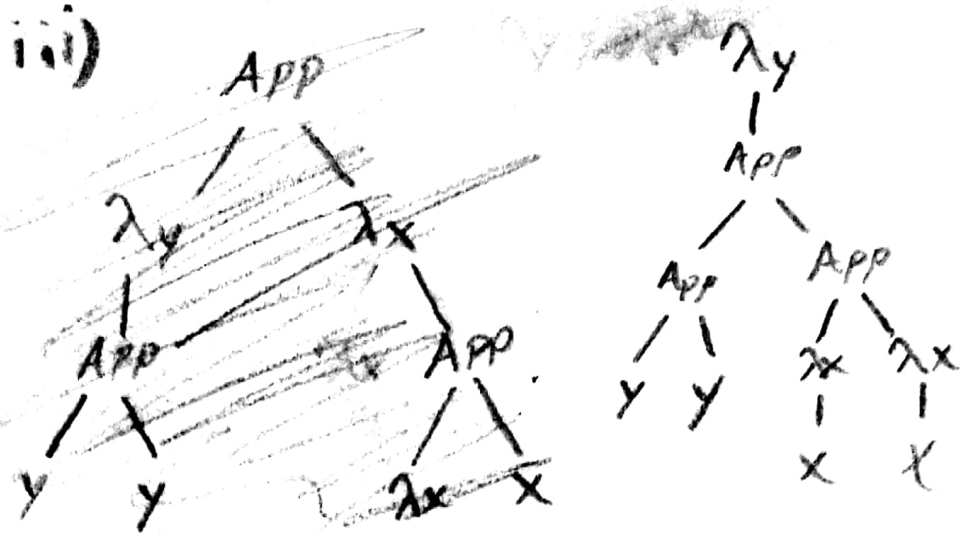
iii) $\lambda y.yy((\lambda x.x)(\lambda x.x))$

i)

ii)



iii)



EXERCISE 1.1

i) $(xy)(\lambda y.\lambda z.z(xy))$

ii) $(\lambda x.\lambda y.\lambda z.(xy)(xz))\ \lambda x.\lambda y.x$

1.2 $(\lambda x.xx)(\lambda x.xx)$