haskell Ch1 excercies

1 — b.

$x \sim n$
$y \sim \wedge$

2 — c

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

$\equiv \lambda ab.aab$ $\quad x \sim a$
$\qquad\qquad\qquad y \sim b$

3 — b $x \sim t$
$\qquad\qquad z \sim s$
$\qquad\qquad y \sim o$

Ch 1 excercies
Combinator?

1 — yes
2 — no
3 — yes
4 — yes
5 — no

normal / diverge

1 — normal • already normal
2 — diverge (omega)
3 normal zzz

Beta Reduce

1. $(\lambda abc.cba)zz(\lambda wv.w)$

$(\lambda bc.cbz)z(\lambda wv.w)$

$(\lambda c.czz)(\lambda wv.w)$

$(\lambda wv.v)zz$

$(\lambda v.v)z$

$\boxed{z}$

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

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

$(\lambda a.a)bb$

$\boxed{bb}$

3. $(\lambda y.y)(\lambda x.xx)(\lambda z.zq)$

$(\lambda x.xx)(\lambda z.zq)$

$(\lambda z.zz)(\lambda z.zq)$

$(\lambda z.zq)q$

$\boxed{qq}$

4. $(\lambda z.z)(\lambda z.zz)(\lambda z.zy)$

$(\lambda z.zz)(\lambda z.zy)$

$(\lambda z.zy)(\lambda z.zy)$

$(\lambda z.zy)y$

$\boxed{yy}$

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

$(\lambda y.(\lambda a.a)yy)y$

$(\lambda a.a)yy$

$\boxed{yy}$

6. $(\lambda a.aa)(\lambda b.ba)c$

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

$(\lambda b.ba)$

aac

7. $(\lambda xyz.xz(\quad))(\lambda x.z)(\lambda x.a)$

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

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

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

$\lambda c.za$