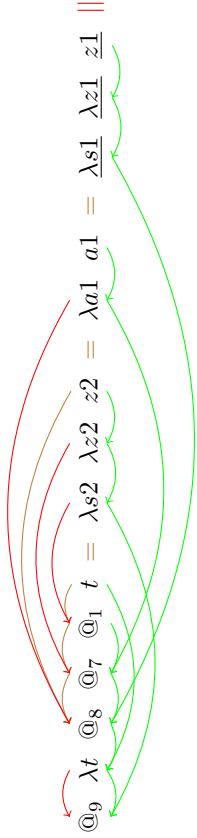




Example p zero

Input term:  $(\lambda x.(((\theta_0(\lambda w.(\lambda v.(\lambda z.(\theta_2(\lambda s.(\theta_3(s)(\theta_4((x\theta_5s)\theta_6z)))\theta_7(\lambda u.(\lambda t.1))\theta_8(\lambda d.1z))))\theta_9(\lambda d2.\lambda z2.z2)$



Normal form:  $\lambda d1.\lambda z1.z1$



Example p two three four

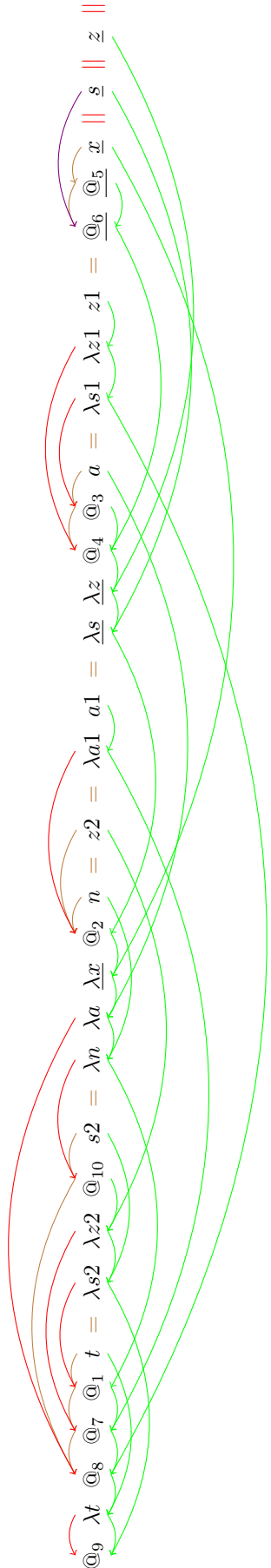
Input term:  $((((\lambda l.(((\lambda l_1.(((\lambda l_2.(((\lambda l_3.(((\lambda l_4.(((\lambda l_5.(((\lambda l_6.(((\lambda l_7.(((\lambda l_8.(((\lambda l_9.(((\lambda l_{10}.(((\lambda l_{11}.(((\lambda l_{12}.(((\lambda l_{13}.(((\lambda l_{14}.(((\lambda l_{15}.(((\lambda l_{16}.(((\lambda l_{17}.(((\lambda l_{18}.(((\lambda l_{19}.(((\lambda l_{20}.z)))))))))))))))))))))))))))))))))$

Normal form:  $\lambda s.\lambda z.s@.(s@.(s@.(s@.(s@z))))))$



Example p one

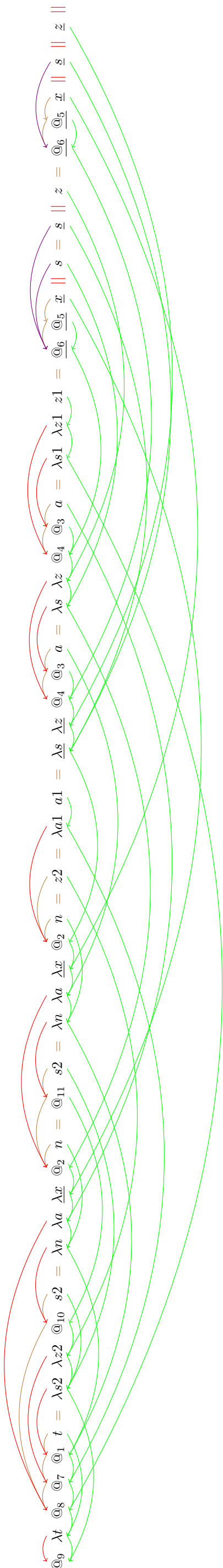
Input term:  $(\lambda x.(((\theta_0(\lambda w.(\lambda v.(\lambda z.v\theta_2(\lambda s.(\theta_3 s)(\theta_4((\tau\theta_5 s)\theta_6 z)))\theta_7(\lambda u.(\lambda t.1)))\theta_8(\lambda d.(\lambda e.1 z))))\theta_9(\lambda d.2 z)\theta_{10} w2))$



Normal form:  $\lambda x. \lambda s. \lambda z. (\tau \theta_5 s) \theta_6 z$

Example p two

Input term:  $(\lambda x.(((\theta_0(\lambda w.(\lambda x.(\lambda z.(\theta_2(\lambda z.(\theta_3 s) \theta_4((\tau \theta_5 s) \theta_6 x))) (\theta_7(\lambda x_1.(\lambda x_1)) \theta_8(\lambda x_1. \lambda x_1 z)))) \theta_9(\lambda x_2. \lambda x_2 z \theta_{10}(\theta_2 \theta_1 + 2))$



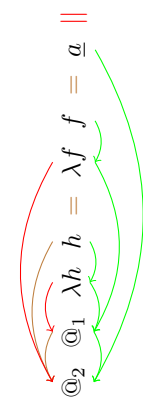


**Example ex.1**  
Input term:  $g\theta_1(\lambda a.n)$

$$\overbrace{\lambda x. \overbrace{\lambda y. \overbrace{g\theta_1(\lambda a.n)}^{\text{input term}}}}^{\text{Normal form: } g\theta_1 a.n}$$



**Example ex 2**  
Input term:  $((\lambda h.h)\theta_1(\lambda f.f))\theta_2 a$



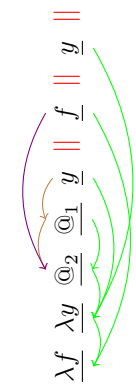
Normal form:  $a$

**Example ex 3**  
Input term:  $((\lambda h.h\theta_1\theta_2)(\lambda f.f))$



Normal form:  $a$

**Example ex.4**  
 Input term:  $\lambda f.\lambda g.f(g\theta_1 f)\theta_2 g$



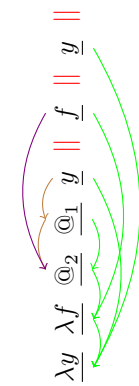
Normal form:  $\lambda f.\lambda g.(g\theta f)\theta g$

**Example ex.4'**  
Input term:  $\lambda f.\lambda g.f(g\theta_1(\lambda z.z))\theta_2g$



Normal form:  $\lambda f.\lambda g.f(g\theta_1\lambda z.z)\theta_2g$

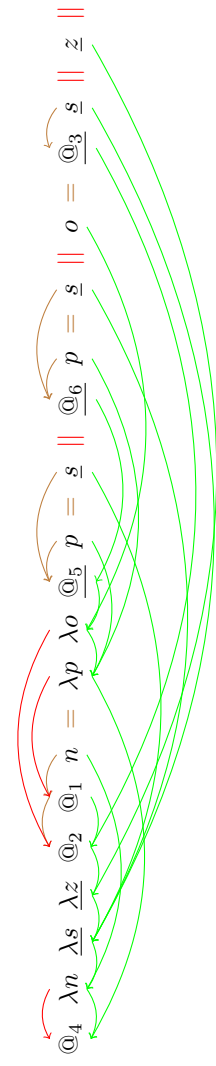
**Example ex.5**  
 Input term:  $\lambda y. \lambda f.(y^6 h_1 f) \theta_2 y$



Normal form:  $\lambda y. \lambda f.(y^6 \theta f) \theta y$

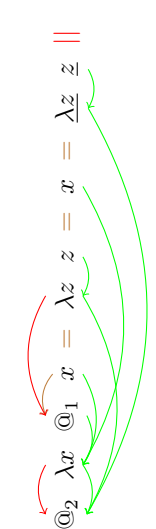
### Example succ two

Input term:  $(\lambda n.\lambda s.\lambda z.(n\mathbb{G}_1s)\mathbb{G}_2(s\mathbb{G}_3z))\mathbb{G}_4(\lambda p.\lambda o.p\mathbb{G}_5(p\mathbb{G}_6o))$



Normal form:  $\lambda s.\lambda z.s@(s@(s@z))$

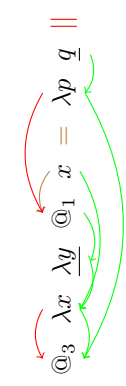
**Example ex. 9**  
Input term:  $(\lambda x.x\theta_1x)\theta_2(\lambda x.z)$



Normal form:  $\lambda x.z$



**Example ex.11**  
Input term:  $(\lambda x.\lambda y.x\theta_1(x\theta_2y))\theta_3(\lambda y.y)$

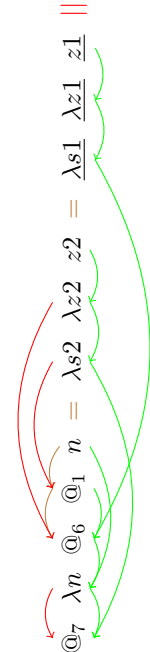


Normal form:  $\lambda y.y$

Example ex f0

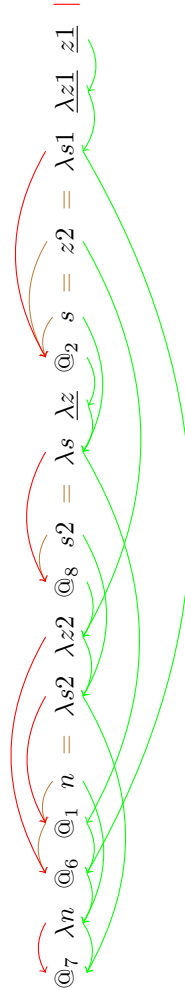
Input term:  $(\lambda w.(r\theta_1)(\lambda s.\lambda z.s\theta_3(s\theta_3((n\theta_4s)\theta_5z)))\theta_6(\lambda x1.\lambda x2.1))\theta_7(\lambda x2.\lambda x2.z2)$

Normal form:  $\lambda s1.\lambda x1.z1$



Example ex.fl

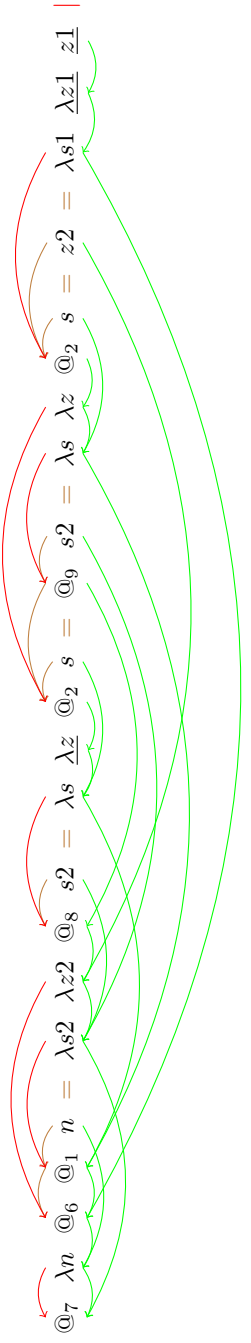
Input term:  $(\lambda w.(r\theta_1)(\lambda x.\lambda z.s\theta_3(s\theta_3((n\theta_4s)\theta_5z)))\theta_6(\lambda v.\lambda t.\lambda z.t))\theta_7(\lambda x2.\lambda z2.s2\theta_8s2)$



Normal form:  $\lambda x.\lambda t.\lambda z.t$

Example ex f2

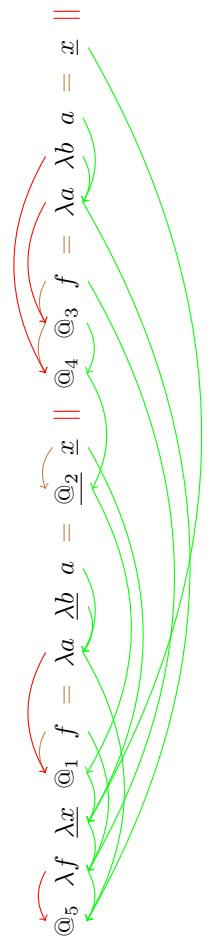
Input term:  $(\lambda n_1.(n_1\theta_1)(\lambda s.\lambda z.s\theta_3(s\theta_3((n_1\theta_1 s)\theta_2 z))))\theta_4(\lambda x1.\lambda x2.1))\theta_7(\lambda x2.\lambda x2.s2\theta_5(s2\theta_6 z2))$



Normal form:  $\lambda x.\lambda x1.x1$

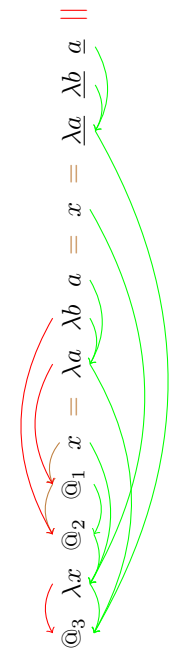
Example ex LO1

Input term:  $(\lambda f.\lambda x.f\ \text{th}_1(x\ \text{th}_2((f\ \text{th}_3\ x^2)\ \text{th}_4\ x)))\ \text{th}_5(\lambda a.\lambda b.a)$



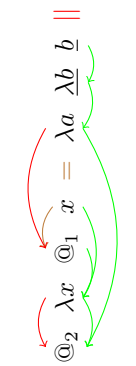
Normal form:  $\lambda x.\lambda b.f\ \text{th}_1(x\ \text{th}_2(x^2\ a))$

**Example ex LO2**  
Input term:  $(\lambda x_1.(x_1x_2))(\lambda x_2.x_2)(\lambda x_3.x_3)(\lambda x_4.x_4)$



Normal form:  $\lambda x_3.x_3$

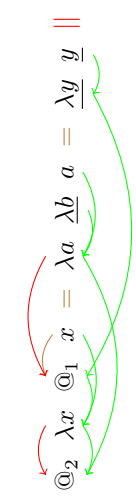
**Example ex LO3**  
Input term:  $(\lambda x.x^{\text{th}}_1(\lambda y.x^{\text{th}}_2))y_2(\lambda a.\lambda b.b)$



Normal form:  $\lambda a.b$



**Example ex LO4**  
Input term:  $(\lambda x.x\Omega)(\lambda y.y)(\Omega a)(\Omega a)(\Omega b)(\Omega a)$



Normal form:  $\Omega\Omega$

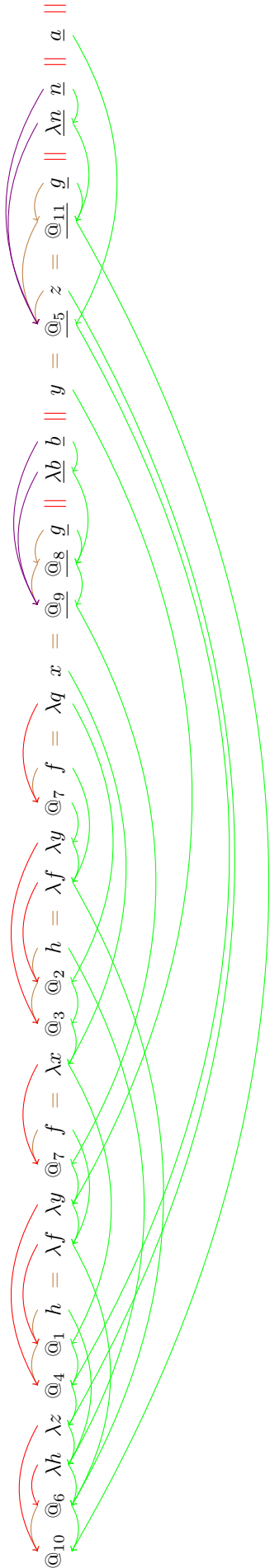
**Example ex.1**  
Input term:  $g\theta_1(\lambda a.n)$

$$\frac{\theta_1}{\lambda} \cdot \frac{\lambda a. n}{\lambda a. n}$$

Normal form:  $g\theta_1 a.n$

Example NPR

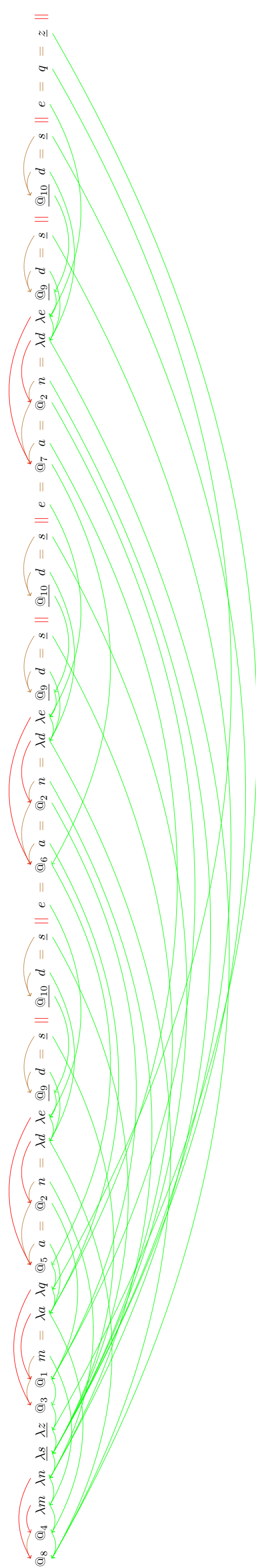
Input term:  $((\lambda b.\lambda c.((\theta b_1(\lambda x.((\theta b_2(\lambda y.x)((\theta b_3(\lambda z.\theta y.c))\theta b_4(\lambda f.\lambda y.f\theta b_7(\theta b_5(\lambda b.b))\theta b_6((g\theta_{11}(\lambda n.n))$



Normal form:  $(g\theta\lambda b.b)\theta((g\theta\lambda n.n)\theta a)$

### Example mut three two

Input term:  $(((\lambda m.\lambda n.\lambda s.\lambda z.(m\mathfrak{Q}_1(n\mathfrak{Q}_2s))\mathfrak{Q}_3z)\mathfrak{Q}_4(\lambda a.\lambda q.a\mathfrak{Q}_5(a\mathfrak{Q}_6(a\mathfrak{Q}_7q))))\mathfrak{Q}_8(\lambda d.\lambda e.d\mathfrak{Q}_9(d\mathfrak{Q}_{10}e)))$



**Normal form:**  $\lambda s.\lambda z.s\tilde{\omega}(s\tilde{\omega}(s\tilde{\omega}(s\tilde{\omega}(s\tilde{\omega}z))))))$

