$$ {}^{o}C_{k} \in \mathfrak{U} | \, C^{\chi} $$

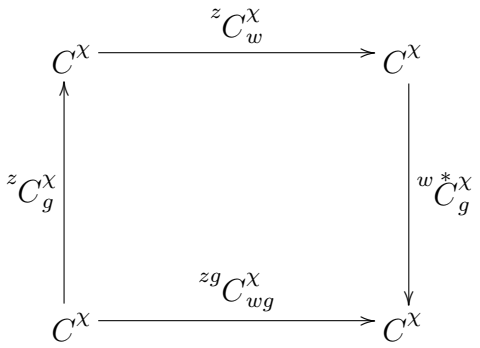
$$ 0 < {}^{o}C_{o} \in \mathfrak{V} | \, C^{\chi} $$

$$ {}^{o}C_{k} \, {}^{o}C_{o} = {}^{o}C_{o} \, {}^{o}C_{k} $$

$$ {}^{z}C_{z} = {}^{o}\overset{*}{C}_{\not z} \, {}^{o}C_{o} \, {}^{o}C_{\not z} $$

$$ \not\emptyset = e_{G} \Longrightarrow {}^{o}C_{\not\emptyset} = e_{C} $$

$$ {}^{zg}C_{wg} = {}^{w}\overset{*}{C}_{g} \, {}^{z}C_{w} \, {}^{z}C_{g} \in C^{\mathbb{C}} $$



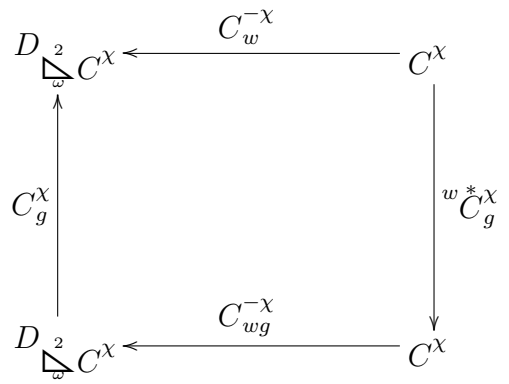
$$ \not z \not g = k \not\sim g $$

$$ {}^{o}C_{\not z \not g} = {}^{o}C_{k \not\sim g} = {}^{o}C_{k} \, {}^{o}C_{\not z} \, {}^{z}C_{g} $$

$$ \text{LHS} = {}^{o}\overset{*}{C}_{\not z \not g} \, {}^{o}C_{o} \, {}^{o}C_{\mathfrak{g}_{zg}} = {}^{o}\overset{*}{C}_{k \not\sim g} \, {}^{o}C_{o} \, {}^{o}C_{k \not\sim g} = \overbrace{{}^{o}C_{k} \, {}^{o}\overset{*}{C}_{\not z} \, {}^{z}C_{g}} \, {}^{o}C_{o} \, {}^{o}C_{k} \, {}^{o}C_{\not z} \, {}^{z}C_{g} $$

$$ = {}^{z}\overset{*}{C}_{g} \, {}^{o}\overset{*}{C}_{\not z} \, {}^{o}\overset{*}{C}_{k} \, {}^{o}C_{o} \, {}^{o}C_{k} \, {}^{o}C_{\not z} \, {}^{z}C_{g} = {}^{z}\overset{*}{C}_{g} \, {}^{o}\overset{*}{C}_{\not z} \, {}^{o}C_{o} \, {}^{o}C_{\not z} \, {}^{z}C_{g} = \text{RHS} $$

$$C_g^{-\chi}\,\underbrace{C_w^{-\chi}\mathbb{1}} = C_{wg}^{-\chi}\,\underbrace{{}^{w}\!\overset{*}{C}{}_g^{\chi}\mathbb{1}}$$



$${}^{zg}\mathrm{LHS} = {}^{zg}\overset{-1}{C}{}_g^{\chi}\,\overbrace{{}^{z}C_w^{-\chi}\mathbb{1}} = {}^{z}C_g^{-\chi}\,{}^{z}C_w^{-\chi}\mathbb{1} = {}^{zg}C_{wg}^{-\chi}\,{}^{w}\!\overset{*}{C}{}_g^{\chi}\mathbb{1} = {}^{zg}\mathrm{RHS}$$

$${}_C G^{-\chi} = \int_{dx}^{D} {}^{o}_{C}G_x^{-\chi}\,{}^{x}_{C}G_x\,{}^{x}_{C}G_o^{-\chi} = \int_{dx}^{D} {}^{o}_{C}G_x^{-\chi}\,{}^{o\mathfrak{g}_z^*}_{C}\mathcal{J}\,{}^{o\mathfrak{g}_z}_{C}\,{}^{x}_{C}G_o^{-\chi}$$

$$\mathcal{J} \underset{\text{bij}}{\mapsto} \bar{\mathcal{J}} = \int_{dx}^{D} {}^{o}_{C}G_x^{-1}\,{}^{x}_{C}G_x\,{}^{x}_{C}G_o^{-1}$$

$${}^{z}_{C}G_w^{-\chi} = \int_{dx}^{D} {}^{z}_{C}G_x^{-\chi}\,{}^{x}_{C}G_x\,{}^{x}_{C}G_w^{-\chi}$$

$$\int_{dx}^{D} {}^{z}_{C}G_x^{-\chi}\,{}^{x}_{C}G_x\,{}^{x}_{C}G_z^{-\chi} = \int_{dx}^{D} {}^{o\mathfrak{g}_z}_{C}G_{x\mathfrak{g}_z}^{-\chi}\,{}^{x\mathfrak{g}_z}_{C}G_{x\mathfrak{g}_z}\,{}^{x\mathfrak{g}_z}_{C}G_{o\mathfrak{g}_z}^{-\chi} = \int_{dx}^{D} \overbrace{{}^{x\mathfrak{g}_z^*}_{C}\mathfrak{g}_z{}^{o}_{C}G_x^{\chi}\,{}^{o\mathfrak{g}_z}_{C}}^{-1}\,{}^{x\mathfrak{g}_z^*}_{C}\,{}^{x}_{C}G_x\,{}^{x\mathfrak{g}_z}_{C}\,\overbrace{{}^{o\mathfrak{g}_z^*}_{C}\mathfrak{g}_z{}^{x}_{C}G_o^{\chi}\,{}^{x\mathfrak{g}_z}_{C}}^{-1}$$

$$= {}^{o}_{C}\mathfrak{g}_z^{-1}\int_{dx}^{D} {}^{o}_{C}G_x^{-\chi}\,{}^{x}_{C}G_x\,{}^{x}_{C}G_o^{-\chi}\,{}^{o\mathfrak{g}_z^*}_{C}\overset{-1}{\mathfrak{g}}_z = {}^{o}_{C}\mathfrak{g}_z^{-1}\,{}_{C}G^{-\chi}\,{}^{o\mathfrak{g}_z^*}_{C}\overset{-1}{\mathfrak{g}}_z = \overbrace{{}^{o\mathfrak{g}_z^*}_{C}\mathfrak{g}_z{}_{C}G^{\chi}\,{}^{o}_{C}\mathfrak{g}_z}^{-1} = {}^{z}_{C}G_z^{-\chi}$$

$$ {}^{w*}_{C}g \; {}^{z}_{C}G^{\chi}_{w} \; {}^{z}_{C}g \; = \; {}^{zg}_{C}G^{\chi}_{wg} $$

$$ \int_{dz}^{D} \underbrace{{}^{z}_{C}g \, {}^{zg}_{C}G^{-\chi}_{wg} \, {}^{w*}_{C}g}_{\mathfrak{f}} \mathbin{\mathfrak{K}} \underbrace{{}^{z}_{C}G_{z} \, \overbrace{{}^{z}g \ltimes \mathfrak{g}}}_{} = \int_{dz}^{D} \underbrace{{}^{zg}_{C}G^{-\chi}_{wg} \, {}^{w*}_{C}g}_{\mathfrak{f}} \mathbin{\mathfrak{K}} \underbrace{{}^{z*}_{C}g \, {}^{z}_{C}G_{z} \, \overbrace{{}^{z}g \ltimes \mathfrak{g}}}_{} = \int_{dz}^{D} \underbrace{{}^{zg}_{C}G^{-\chi}_{wg} \, {}^{w*}_{C}g}_{\mathfrak{f}} \mathbin{\mathfrak{K}} \underbrace{{}^{zg}_{C}G_{zg} \, {}^{z}_{C}g^{-1} \, \overbrace{{}^{z}g \ltimes \mathfrak{g}}}_{} $$

$$ = \int_{dz}^{D} \underbrace{{}^{zg}_{C}G^{-\chi}_{wg} \, {}^{w*}_{C}g}_{\mathfrak{f}} \mathbin{\mathfrak{K}} \underbrace{{}^{zg}_{C}G_{zg} \, {}^{zg}}_{\mathfrak{g}} \underset{\text{inv}}{=} \int_{dz}^{D} \underbrace{{}^{z}_{C}G^{-\chi}_{wg} \, {}^{w*}_{C}g}_{\mathfrak{f}} \mathbin{\mathfrak{K}} \underbrace{{}^{z}_{C}G_{z} \, {}^{z}}_{\mathfrak{g}} = \underbrace{{}_{C}G^{-\chi}_{wg} \, {}^{w*}_{C}g}_{\mathfrak{f}} \mathbin{\mathfrak{K}} \mathfrak{g} $$

$$ = \overbrace{{}^{w*}_{C}g \, \mathfrak{f}} \mathbin{\mathfrak{K}} {}^{wg}\mathfrak{g} = \mathfrak{f} \mathbin{\mathfrak{K}} \underbrace{{}^{w}_{C}g \, {}^{wg}}_{\mathfrak{g}} = \mathfrak{f} \mathbin{\mathfrak{K}} {}^{w}\overbrace{g \ltimes \mathfrak{g}} = \underbrace{{}_{C}G^{-\chi}_{w}}_{\mathfrak{f}} \mathbin{\mathfrak{K}} \underbrace{g \ltimes \mathfrak{g}}_{} = \int_{dz}^{D} \underbrace{{}^{z}_{C}G^{-\chi}_{w}}_{\mathfrak{f}} \mathbin{\mathfrak{K}} \underbrace{{}^{z}_{C}G_{z} \, \overbrace{{}^{z}g \ltimes \mathfrak{g}}}_{} $$

$$ \int_{dx}^{D} {}^{z}_{C}G^{-\chi}_{x} \; {}^{x}_{C}G_{x} \; {}^{x}_{C}G^{-\chi}_{z} \; = \; {}^{o}_{C}g^{-1}_{z} \left(\underbrace{\int_{dx}^{D} {}^{o}_{C}G^{-\chi}_{x} \; {}^{x}_{C}G_{x} \; {}^{x}_{C}G^{-\chi}_{o}}_{= C} \right) {}^{o}_{C}g^{-*}_{z} $$

$$ \int_{dx}^{D} {}^{z}_{C}G^{-\chi}_{x} \; {}^{x}_{C}G_{x} \; {}^{x}_{C}G^{-\chi}_{z} = \int_{dx}^{D} {}^{og}_{C}G^{-\chi}_{x} \; {}^{x}_{C}G_{x} \; {}^{x}_{C}G^{-\chi}_{og} = \int_{dx}^{D} {}^{og}_{C}G^{-\chi}_{xg} \; {}^{xg}_{C}G_{xg} \; {}^{xg}_{C}G^{-\chi}_{og} = \int_{dx}^{D} {}^{o}_{C}g^{-1} \; {}^{o}_{C}G^{-\chi}_{x} \; {}^{x}_{C}g^{-*} \; \overbrace{{}^{x}_{C}g^{-1} \, {}^{x}_{C}G^{-\chi}_{x} \, {}^{x}_{C}g^{-*}} \; {}^{x}_{C}g^{-1} \; {}^{x}_{C}G^{-\chi}_{o} \; {}^{o}_{C}g^{-*} $$

$$ = \int_{dx}^{D} {}^{o}_{C}g^{-1} \; {}^{o}_{C}G^{-\chi}_{x} \; {}^{x}_{C}g^{-*} \; {}^{x}_{C}g \; {}^{x}_{C}G_{x} \; {}^{x*}_{C}g \; {}^{x}_{C}g^{-1} \; {}^{x}_{C}G^{-\chi}_{o} \; {}^{o}_{C}g^{-*} = \int_{dx}^{D} {}^{o}_{C}g^{-1} \; {}^{o}_{C}G^{-\chi}_{x} \; {}^{x}_{C}G_{x} \; {}^{x}_{C}G^{-\chi}_{o} \; {}^{o}_{C}g^{-*} = {}^{o}_{C}g^{-1} \underbrace{\int_{dx}^{D} {}^{o}_{C}G^{-\chi}_{x} \; {}^{x}_{C}G_{x} \; {}^{x}_{C}G^{-\chi}_{o}}_{} \; {}^{o}_{C}g^{-*} $$