$$I \xrightarrow{\ \unicode{x1E7}\ } \mathbb{C}_\wedge$$

$$\int^{\unicode{x1E7}} \underline{\eta}/\eta = \int\limits_{dt}^{I} {}^{t}\underline{\unicode{x1E7}}\ {}^{t\unicode{x1E7}}\overline{\eta/\eta}$$

$$\mathbb{C}_\wedge \xrightarrow[S]{T} \mathbb{C}_\wedge$$

$$\tau \rtimes T = \tau + 1$$

$$\tau \rtimes S = -\tau^{-1}$$

$$\int^{\unicode{x1E7} \rtimes T} \underline{\eta}/\eta = \int^{\unicode{x1E7}} \underline{\eta}/\eta$$

$${}^{t}\widehat{\unicode{x1E7} \rtimes T} = {}^{t}\unicode{x1E7} + 1 \Rightarrow {}^{t}\underline{\unicode{x1E7} \rtimes T} = {}^{t}\underline{\unicode{x1E7}}$$

$${}^{\tau+1}\eta = {}^{\tau}\eta \Rightarrow {}^{\tau+1}\underline{\eta} = {}^{\tau}\underline{\eta} \Rightarrow {}^{\tau+1}\overline{\eta/\eta} = {}^{\tau}\overline{\eta/\eta}$$

$$\Rightarrow \text{LHS} = \int\limits_{dt}^{I} {}^{t}\underline{\unicode{x1E7} \rtimes T}\ {}^{t\unicode{x1E7}+1}\overline{\eta/\eta} = \int\limits_{dt}^{I} {}^{t}\underline{\unicode{x1E7}}\ {}^{t\unicode{x1E7}}\overline{\eta/\eta} = \text{RHS}$$

$$\int^{\unicode{x1E7} \rtimes S} \underline{\eta}/\eta = \int^{\unicode{x1E7}} \underline{\eta}/\eta + k \log {}^{r^I}\unicode{x1E7} / {}^{\ell^I}\unicode{x1E7}$$

$${}^{t}\widehat{\unicode{x1E7} \rtimes S} = -1/{}^{t}\unicode{x1E7} \Rightarrow {}^{t}\underline{\unicode{x1E7} \rtimes S} = {}^{t}\underline{\unicode{x1E7}} / {}^{t}\unicode{x1E7}^{2}$$

$${}^{\tau \rtimes S}\eta = \tau^{k}\ {}^{\tau}\eta \Rightarrow \frac{1}{\tau^2}\ {}^{\tau \rtimes S}\underline{\eta} = {}^{\tau}\underline{S \ltimes \eta} = {}^{\tau}\underline{()^{k}}\eta = k\tau^{k-1}\ {}^{\tau}\eta + \tau^{k}\ {}^{\tau}\underline{\eta}$$

$$\Rightarrow \frac{1}{\tau^2}\ {}^{\tau \rtimes S}\overline{\underline{\eta}/\eta} = \frac{k}{\tau} + {}^{\tau}\overline{\eta/\eta}$$

$$\Rightarrow \text{LHS} = \int\limits_{dt}^{I} {}^{t}\underline{\unicode{x1E7} \rtimes S}\ {}^{-1/{}^{t}\unicode{x1E7}}\overline{\eta/\eta} = \int\limits_{dt}^{I} \frac{{}^{t}\underline{\unicode{x1E7}}}{{}^{t}\unicode{x1E7}^{2}}\ {}^{t\unicode{x1E7} \rtimes S}\overline{\eta/\eta} = k\int\limits_{dt}^{I} {}^{t}\underline{\unicode{x1E7}} / {}^{t}\unicode{x1E7} + \int\limits_{dt}^{I} {}^{t}\underline{\unicode{x1E7}}\ {}^{t\unicode{x1E7}}\overline{\eta/\eta} = \text{RHS}$$