

Schwarz 25.4 (a)

$$\begin{aligned}\delta\phi &= i\theta^a T_R^a \phi, & \delta\phi^\dagger &= i\theta^a \overline{T_R}^a \phi \\ & & &= -i\theta^a \phi^\dagger T_R^a \\ \delta\phi^* &= -i\theta^a T_R^{*a} \phi^*\end{aligned}$$

$$\Rightarrow \overline{T_R} = -T_R^*$$

$$\text{tr} [T_R^a \{T_R^b, T_R^c\}] = -\text{tr} [T_R^{*a} \{T_R^{*b}, T_R^{*c}\}]$$

T_R hermitian traceless, $= -\text{tr} [(T_R^{-1T})^a \{(T_R^{-1T})^b, (T_R^{-1T})^c\}]$

$T^{*T} = -1, T^* = -1^T$

$$= -\text{tr} [T_R^a \{T_R^b, T_R^c\}]$$

$$= \boxed{-A(R) d^{abc}}$$

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