trace of Γ-matrices

$$\text{tr}\left(\Gamma^1 \Gamma^2 \Gamma^3 \Gamma^4 \Gamma^5 \Gamma^6 \Gamma^7 \Gamma^8\right) \qquad \text{tr}\left(A^1 a^2 A^3 a^4 A^5 a^6 A^7 a^8\right)$$

possible terms from contractions

I. $a^4 \, \text{tr}\left(A_\mu A^\mu A_\nu A^\nu\right)$ 　　　　II. $a^4 \, \text{tr}\left(A_\mu A_\nu A^\mu A^\nu\right)$

III. $a^2 \, \text{tr}\left(A_\mu \, a\cdot A \, A^\mu \, a\cdot A\right)$ 　　IV. $a^2 \, \text{tr}\left(A_\mu A^\mu \, a\cdot A \, a\cdot A\right)$

V. $\text{tr}\left(a\cdot A \; a\cdot A \; a\cdot A \; a\cdot A\right)$

look at III.

all possible contractions

$+ A a A a A a A a \qquad + A a A a A a A a$

$- A a A a A a A a \qquad - A a A a A a A a$

$- A a A a A a A a \qquad - A a A a A a A a$

$+ A a A a A a A a \qquad + A a A a A a A a$

$+ A a A a A a A a \qquad - A a A a A a A a$

$+ A a A a A a A a \qquad - A a A a A a A a$

$A a A a A a A a \qquad$ same as above