```
(5,1
 a) i, Qu = guv a = (guv) -7 a
                        2=> 9 m an = a
             anbu = an gur b, = guranbr = arbr = auba
             \partial u(a-x) = \partial u(aux^m) = au \partial ux^m = au \frac{\partial}{\partial x^m}x^m = au
    iii)
             \partial^{n}(a \times x) = (\partial^{n}(a^{n} \times u) = a^{n} \partial^{n} \times u = a^{n} \partial_{n}(a \times x) = \partial_{n}a_{n}x^{n}
       i) (1x.1y) = (1x) u (1y) = (1x) u g u (1y) ~
                  = 1 x x y g mo 1 x y g
                                                               (x \cdot y) = x^{\mu}g_{\mu\nu} y^{\nu}
                  = 1 d g h 1 l x x y p
                                                                    \rightarrow x^{\tau}gy
                  = 9 × B × 2 y B
         A \cdot B \longrightarrow \sum_{k} A^{ik} B^{kj}
         AT.B -> SARiBRI
               det (\Lambda^7 g \Lambda) = det (\Lambda^7) det (g) det (\Lambda) \stackrel{.}{=} det (g)
           der (1) = det (1) because der (A) = \(\sum_{\sigma} \text{sgn(\sigma)} \) \(\tau_{i,\sigma}\)
                                         dec(AT) = Z sgn(G) Ti agi, i
                => ( det ( 1 ) ( = 1
 iii) Defs of group:
           Closure, (A - A') \in \mathbb{R}^{4 \times 4}
                                   (\Lambda \cdot \Lambda')^{\tau} g (\Lambda \cdot \Lambda') = \Lambda^{\tau} \Lambda^{\tau} g \Lambda \cdot \Lambda'
                                    (1-1). 1" = 1.(1'.1") matrix multipli-
             Associativity
             I dentity
                                   1.1 = 14 = invertible shown before
             Inverse
```

$$(A \cdot A^{-1})^{T} g (A \cdot A^{-1})$$

$$= A^{-1} T A^{T} 3 A A^{-1}$$

$$= A^{-1} T 3 A^{-1} = g$$

$$= A \cdot A^{-1} e L$$

iv)
$$A \cdot A \cdot g = A \cdot A \cdot A^{-1} \cdot g A^{-1} \cdot T = A g A^{-1} T$$

$$A \cdot A \cdot g$$

$$A \cdot A \cdot g$$

$$= (g^{a}_{a} - S w^{a}_{a}) S_{ae} (g^{b}_{a} - S w^{b}_{a}) = S_{av}$$

$$= (g^{a}_{a} - S w^{a}_{a}) S_{ae} (g^{b}_{a} - S w^{b}_{a}) = S_{av}$$

$$= (g^{a}_{a} - S w^{a}_{a}) S_{ae} (g^{b}_{a} - S w^{b}_{a}) = S_{av}$$

$$= (g^{a}_{a} - S w^{a}_{a}) S_{ae} (g^{b}_{a} - S w^{a}_{a}) + \theta (w^{a}_{a})$$

$$= (g^{a}_{a} - S w^{a}_{a}) S_{ae} (g^{a}_{a} - S w^{a}_{a}) + \theta (w^{a}_{a})$$

$$= (g^{a}_{a} - S w^{a}_{a}) S_{ae} (g^{a}_{a} - S w^{a}_{a}) S_{ae} (g^{a}_{a} - g^{a}_{a}) S_{ae} (g^{a}_{a} - g^{a}_{a}) S_{ae} (g^{a}_{a} - g^{a}_{a})$$

$$= (g^{a}_{a} - g^{a}_{a} - g^{a}_{a}) S_{ae} (g^{a}_{a} - g^{a}_{a})$$

$$= (g^{a}_{a} - g^{a}_{a} - g^{a}_{a}) S_{ae} (g^{a}_{a} - g^{a}_{a}) S_{ae} (g^{a}_{a} - g^{a}_{a}) S_{ae} (g^{a}_{a} - g^{a}_{a})$$

$$= (g^{a}_{a} - g^{a}_{a} - g^{a}_{a}) S_{ae} (g^{a}_{a} - g^{a}_{a}) S_{ae} (g^{a}_{a} - g^{a}_{a}) S_{ae} (g^{a}_{a} - g^{a}_{a})$$

$$= (g^{a}_{a} - g^{a}_{a} - g^{a}_{a}) S_{ae} (g^{a}_{a} - g^{a}_{a}) S_{ae} (g^{a}_{a} - g^{a}_{a}) S_{ae} (g^{a}_{a} - g^{a}_{a})$$

$$= (g^{a}_{a} - g^{a}_{a} - g^{a}_{a}) S_{ae} (g^{a}_{a} - g^{a}_{a}) S_{ae} (g^{a}_{a} - g^{a}_{a}) S_{ae} (g^{a}_{a} - g^{a}_{a})$$

$$= (g^{a}_{a} - g^{a}_{a} - g^{a}_{a}) S_{ae} (g^{a}_{a} - g^{a}_{a}) S_{ae} (g^{a}_{a} - g^{a}_{a}) S_{ae} (g^{a}_{a} - g^{a}_{a})$$

$$= (g^{a}_{a} - g^{a}_{a} - g^{a}_{a}) S_{ae} (g^{a}_{a} - g^{a}_{a}) S_{ae} (g^{a}_{a} - g^{a}_{a}) S_{ae} (g^{a}_{a} - g^{a}_{a})$$

$$= (g^{a}_{a} - g^{a}_{a} - g^{a}_{a}) S_{ae} (g^{a}_{a} - g^{a}_{a}) S_{ae} (g^{a}_{a} - g^{a}_{a}) S_{ae} (g^{a}_{a} - g^{a}_{a})$$

$$= (g^{a}_{a} - g^{a}_{a} - g^{a}_{a}) S_{ae} (g^{a}_{a} - g^{a}_{a}) S_{ae} (g^{a}_{a} - g^{a}_{a})$$

$$= (g^{a}_{a} - g^{a}_{a} - g^{a}_{a}) S_{ae} (g^{a}_{a} -$$