A.16

classmate
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COMPLEMENTARY SUBSPACES:

Let $V(F)$ be a V.S and W_1 & W_2 are two subspaces of V. Then W_1 & W_2 are said to be complementary subspaces of each others if, $V = W_1 \oplus W_2$

Eg: $W_1 = \{(x,0,0) : x \in \mathbb{R}\} < \mathbb{R}^3(\mathbb{R})$. Then what is the complementary subsp. of W_1?

Soln: $V = W_1 \oplus W_2$

$(x,y,z) = (x,0,0) + (0,y,z)$

$\Rightarrow \exists\ W_2 = \{(0,y,z) : y \in \mathbb{R},\ z \in \mathbb{R}\}$

★Th.6 EXISTENCE TH. OF COMPLEMENTARY SUBSPACES.

Let $V(F)$ be a V.S. and $W_1 < V$.
Then $\exists$ a complementary subsp. say W_2 s.t. $\boxed{V = W_1 \oplus W_2}$

COSET OF A SUBGP. IN A GP.

Let $(G, *)$ be a gp. and H be a SUBGP. of G
Then, for any $\boxed{a \in G;\ a*H = \{a*h : \forall h \in H\}}$
$= \{a*e, a*h_1, a*h_2, \dots\}$
$=$ LEFT COSET.

For any, $a \in G$; $H*a = \{h*a : \forall h \in H\}$
$=$ RIGHT COSET.

- In general ; $\boxed{a*H \neq H*a}$
- If G is abelian gp. then $\boxed{a*H = H*a}$