LEMMA : disjointedness of VAL*,
- DIV/0*,
- ATM*

$VAL^* \cap DIV/0^* = \phi$

$VAL^* \cap ATM^* = \phi$

$ATM^* \cap DIV/0^* = \phi$

PROOF

let $\alpha, \beta \in \{ VAL, DIV/0, ATM \}$

let $e \in \alpha^*$, and we show that

$e \in \beta^* \quad \alpha = \beta$

$e \in \alpha^*$

$\therefore$ by def $e \xrightarrow{*} e_n$

where $e_n \alpha$ for some e_n

similarly,

$e\ \beta^*$

$\therefore$ by def. $e \xrightarrow{*} e_m$

where $e_m\ \beta$ for some β

but,
normal forms in $\rightarrow$ are unique

$e_n = e_m$

also by partition theorm on normal forms

$e_n\ \alpha$, and

$e_n\ \beta$

is possible only if

$\alpha = \beta$

QED