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1. R named Cyclic : $aRb \wedge bRa \rightarrow cRa$. Show that if R is equivelence relation in A, then R is reflexive and cyclic.

Proof Since R is equivelence over A then it is already true that R is refexive

And also if R is equivelence over A then R is transitive and symetric.

From above, to be cyclic $aRb \wedge bRc \rightarrow cRa$, and from transitive $aRb \wedge bRa \rightarrow aRc$ and $aRc \rightarrow cRa$

$\therefore aRb \wedge bRc \rightarrow cRa$

$\therefore$ If R is equivelence over A then R is cyclic and reflexive

2. Let R be relation on set ordered pairs of $\mathbb{Z}^+$ such that $\{(a,b),(c,d)\} \in R$ iff $ad = bc$. Show that R is an equivelence relation.

Proof

Reflexive : R is reflexive because $\{(a,b),(a,b)\} \in R$ because $ab = ba$

Symetric : R is symetric since $\{(a,b),(c,d)\} \in R$, then $ad = bc$, which means $cb = da$ which mean $\{(c,d),(a,b)\} \in R$

Transitive : If $\{(a,b),(c,d)\} \in R$ and $\{(c,d),(e,f)\} \in R$, then $\underset{①}{ad = bc}$ and $\underset{②}{cf = de}$

① × ② we got $a\cancel{cd}f = b\cancel{cd}e$

$af = be$ which mean $\{(a,b),(e,f)\} \in R$ $\therefore$ R is transitive

$\therefore$ R is an equivelence relation