

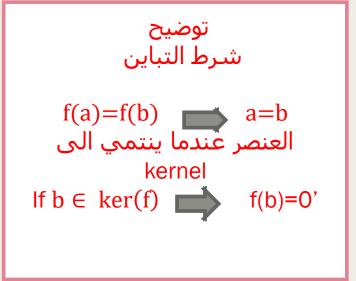


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LECTURE NO. 16

<u>**Theorem8:**</u> Let f be a ring homomorphism from (R, +, .) into the ring (R', +, .) then f is one to one iff ker $(f) = \{0\}$.

<u>Proof</u>: Let ker(f) = $\{0\}$ and let f(a)=f(b); $a, b \in \mathbb{R}$ \Rightarrow f(a) - f(b) = 0' \Rightarrow f(a - b) = 0'[since f is homo.] \Rightarrow a – b \in ker(f) = {0} \Rightarrow a – b \in ker(f) = {0} $\Rightarrow a - b = 0$



 \Rightarrow a = b

\therefore f is one to one

<u>Conversely</u>: Let f be 1–1 and let $a \in \text{ker}(f) \Rightarrow f(a) = 0'$

- but f(0) = 0' $\Rightarrow f(a) = f(0)$ and since f is 1-1
 - $\Rightarrow a = 0$
 - $\therefore \ker(f) = \{0\}$