جامعة تكريت
كلية التربية للبنات
قسم الرياضيات

محاضرة بعنوان
(التماثل)

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Isomorphism – التماثل

Def\ let f: (R, + , .) $\longrightarrow$ (Ŕ,∓, .·) be aring homo. We said that f is isomorphism if f is

One – to – one and on to that is ; the function f : (R , + , .)$\longrightarrow$

(Ŕ, ∓ , .·)is said isomorphism if satisfies these conditions :

1)f is homo

2)f is I-I

3)f is on to

Then its called (R, + , .)isomorphism to (Ŕ, ∓, .·).

We we written (R, + , .) ≈(Ŕ, ∓ , .·)

Ex \ Let f : R$\longrightarrow$R such that $f(x)=2^x$-$\forall x \epsilon R$ show that f is aring homo or not ?

soL \ 1- let a,b ϵ R

$f(a+b)=2^{a+b}=2^a. 2^b \neq f(a)\ f(b)$ since 1,2ϵ R

$f(1,2)=f(3) = 2^3=8$

$f(1) + f(2) = 2+2^2=2+4=6$ f is not hom .

f is not

2) let a,b ϵ R $\ni$ f(a)= f(b) $2^a=2^b$

$Ln2^a=Ln2^b$

$\frac{a ln 2}{ln2} = \frac{b ln 2}{ln2}$ a=b

3) let $2^a \epsilon R . \longrightarrow a \epsilon R \ni \quad f(a) = 2^a$

Ex) let f:z ⟶ze ∋f(a)=zaϵz show that z ≅ze or not?

Sol)1- let a,b ϵ z

$F(a+b) = 2(a+b) = 2a + 2b = f(a) + f(b)$

$F(a.b) = 2(a.b) = 2a.b \neq f(a) . f(b)$ is not hom .

Ex) let f: z⟶ze ∋f(a)=2a ∀ aϵz show that z≅ze or not ?

$F(2,3)=2.6=12$

$F(2)\ f(3)=4.6=24$

F is not homo . f is not iso

Example :Let R be aset of real number and "." Is a usual multiplication on R .show that (R/{0})is an abelian group

Sol/1-R/{0}≠Qis anon-empty set

2-Let a,b∈R/{0}

⟶ *a≠0,b≠0 then a.b≠0*

⟶ *a.b∈R/{0}*

R/{0} is closed under"."

i.e\R/{0}xR/{0}R/{0} such that

(a.b)=a.b

,∀a,b∈R/{0}

so "." is abinary operation on R/{0}

3-Let a.b,c∈R/{0}then

a.(b.c)=(a.b).c

⟶ *(R/{0})is semi-group*