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	ribed	form	My	as a	· funch	from	AXA	to B.
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	(Fig.	£10)	- 0	oke	- 434.1	لاسيا	la .	
lacksquare	\$7.1	Fig:	$\overline{\mathbb{O}}^{\frac{2}{p}}$		A. W.	1	Figs-(5 / ///
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t	1 01	λ	0 40		1 5 6	A 24	Aug by	Tom Ax
t	Let	10 U	-2365	7 30			400	ect A.
1	Lr B				AXA	fire	400000000000000000000000000000000000000	d to 60
1		- Table 1		F 1 1	that is	1000.000	/T 2 455	3/
-	6,	nary		1,000	and mark			1000000

	Let the function from AXA to A be named
V	f. or artaz
-	i f(a, a,) will denote the image of
	the ordered pour (a, a) in AXA.
	operator symbols: - * * + , I, A, as bits ap
	on a set. Thus we write
1	$\star(a_1,a_1)$ or $a_1\star a_2$
-	A set together with a nor of oph on
1	the set, is called an algobraic systemic
	or simply an algebra.
	Let (A, x) and (B, o) he two algebraic
	systems of the same type. The algebra
4	(AXB, 1) is called the direct product of
	- his algebras (1, x) & st (B, a), if the oph
	IT is defined for any a, 92 GA + 6, 65 (B)
	(a, b,) 1] (a, b) = (a, xa, b, 0 b)
-	$(\alpha_1, \epsilon_1) \cap (\alpha_2, \epsilon_2) = (\alpha_1, \alpha_2, \epsilon_1) \cap (\alpha_2, \epsilon_2)$
91	The algebras (A, *) 4 (B,0) are called the
1 to 10	factor algebra's of (AXB, 11).
	G-zoups:
1/	Let * be a timary op on a set A. The
7	op" * is said to be associative it (a * b) *C = a* (b*C)
- Alla .	for all a, b, c in A.
100 V V	40 Y (W 51, 0) C
A Charles	Let (A, *) be an algebra where * i's
	brany of on A. (A. *) is called a somi
	group if the following cond are satisfied:
1	1. × is a closed op.
a land	by + is an associative op".
	And the first the second secon

Ex1:- A= {2, 4, 6, } all even the int. +
+ we the ordinary add opt
D A S S S S S S S S S S S S S S S S S S
GX 2' N= { x, B, 8, al, xB, d8,, xd1,} set
of all nonempty str. from s= {x, B, 2}
Let A-B a. t be the tim. op" which concat at
string adb.
Let (A,*) be an algebra where * its a hin
op on A. An element e, in A i's said to
be a left identity if for all x in A,
M element e in A is said to be
right identity if for all ac in A, xxe==c
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
a b 2 B 7 1 1 X X B 6 7
13 d B & S B d D
8 4 18 8 3 8 7 8 4 3
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
the said of the said ordinates and (or a) top it
Suppose e, & les are might left of right
identity of an algebra (A, X). Since E, is
left identity, e, # e2 = e2, also e2 is
right identity, then e, + ez = e, Thus we
have E = ez. It follows that w. r. t. tus
bin, op, there is at most one identity.
Ex! let (N, +) be an algebra, where N is
sol of norwal nos. 4 + is the ord. of odd
op" of integers, clearly o is the identity.
Let (1,x) be an algebra, where x is a timary op
on A. (A, 4) is called a monoid if the following.
rond are satisfied:
2/20 12 any asso, op"
37 There is an identity.
Commend has Come Co

Ex: A be a set of people of diff. high
A be a birary open such that a A
equal to the taller one of a Andi
we note that (A, A) is a married where
identity is the shortest person in A.
Let (Ax) be an algebra with an identity
Let a be an element in A. An element
bis and to be left invouse of a It
by a = e. An element to is said to ke
angut inverse of a it at b = E.
XX P P 8
d x B 8 6
B B S x 7 Fig!
of B B 3 d dis identity.
6 8 2 1 5
Big left inv of 1 & 6 is hight inv of 7
1 19 ter 1 1 4 10 13 MgW 11 10 1
Let (1,4) be an algebra where & is him
of (A, 4) is called a group if the toil.
cond are satisfied:
1) * is a closed of
24 4 is an associative of
34 There is an identity.
47 Every element in A has left inv.
P.7 left inv is also right invi
Let to be a left inv of a + c
be left inv of b. Let e be identity. Since
$(b \neq a) \neq b = e \neq b = e + \rightarrow 0$
we have
(*((b*10)*b) = C*16 = e - E
Exem (() = = () = () = () = () = ()
(* ((p2-0)2 p) = (((2+1)2 p)2 p
= exax + = a x 6 -3
we have a 4-6 = e -> From 2 4 3

p. T. there is an unique in your every clean
-> Suppose both to 4 clane in is a a
1.e 4 2 4 c 4 c 24 a = e
It follows that
(b x a) x b = (c x a) x b
6×(a) = C×(a×6)
⇒ 15, 2 C
Ex 1. (I,+) be an algebra, whome I is the
set of all integers of the rest and ord, add op" of integers. It is clear that (I, t) i
a group with o being the identity of the invol
n being -n.
Vivial Vi
Ex 2. Let G= { EVEN, ODD } a a bin op he define
as in Aig below:
(FVEN. CIDD.
Identity -> OVER EVEN ODD
Inv: BOTH EVEN 4 ODD ODD ODD EVEN
are their own invs
The sould be an in the sould be an interest be a
En 3. Let Zn = §0,1,2, nn, m-14. Leli De a 61n
Of on Zn S.t. for a 46 in Zn
aBb= {altbo if atben !
latern it att >n 3
Identity -> 0
tovota -> b of (a+b) mod n = 05
$(\alpha^{-1} = n - \alpha)$
Con up Malada mult of nxn real malaires, with
non-zero determinant.
A to the second
let I be a kinary of on A. The of
is parely to be commutative if a 76 to 679
for all aib in A.

The same	
A9	
# 8	(A.*)
	1 I was a second to the second
	A group is called a commutative group opin
1	3
1 7	Set S
4	Algebra with one op * Closure property 1:2 & a, b Cs => ax b Cs
14	Closure proposit
-0	Semi Group -> Closure property -> Associative proprie Va, b, CES => ax(bxC)= (ax6)x C
	Associative Propriet (ax6)x C
11.	Monard -> Clasure property
	Monoid > Clobuse property Associative prot.
P / 3	Fristerno of identity element
	ic ta ES 7 e Es such that axe = axe=a
	Group - closure property.
At Mark	Associative
1	Identity,
	Existence of invente element
- 11	ine ya ES FLES Such Ahat axb=e=bxa
× 10	
1	Abelianor Closure
	Commutative -> Associative Cracip -> Identity
	-> Inverse -> Commutative property
	1.c Vabes axt= bxa.
	1.0 40,622
	1 1 O 1 1 O 1 TO 1 TO 1 TO 1 TO 1 TO 1
	Let Rt be the set of all the votion
	numbers & & a binary of on R+ define
	axb = ab/3 14 an abblian gr
	axt = as s an acceram giffs
1000	· Classes hooking V o I i O o
v - 1	1. Clouve prop: Vat in RT
1	10 ax6 ab/3 E R+
The second second	hence Rd is closed with x op?
	2. Acco. profit Valle CRH
	All the second s

$(a \times b) \times c = ab \times c = ab \cdot c = ab \cdot c$
3 1 3 9
1)=1 a: 3; = 1 a x b x = a x (b x c)
i + is asso, on Rt.
3. Existence of Identity:
3
1.c ax3 = 3x a = 9.
: 3 is identity element for x.
4. Existence of Inverse:
$a \times b = 3 \implies ab/3 = 3 \implies b = 9/4$
Every Element in Rt has Inverse,
5. Commutadive prof. :- Y a. b. in Rt
1 1 x 6 = ab = ba = 6 x a
. (R+, x) is an abelian grp.
(R+, X) is an abelian grp.
Ex 2: - The Set Q, of all Rational nos. other
man I with op" & defined by axb = a+b-ab
ie an abelian grp.
1) Closure prop. :- a, b & Q, & a # 1, b # 1
Hence X is closed on a
Hence A 13 Cluse in the
27 Associative propir + a, b, c in a
(axb)x(= (a+6-ab) x C = a+6-ab +(+(a+6-ab))
- athtc-ab-ac-bctabc30
1 vc) - A v (b+c-bc) = a+(b+c-bc) +(b+c-bc)
all the al = lec - ac tabe.
Hence (0 x 6) xc = 0 x (6xc) : x is asso, ones
0 100 0 000

	3. Existence of Identity: Va in A, -# 3 em
1000	ate + ae = 1 => e(1-a) += = 0
THE STATE OF THE S	=> @ = 0 as a # 1
	10 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
100	4. Existence of This Va in A. 7 bea.
	sixh -that ax 1- =0 => a+6-a6=0
	a + 6(100) = 0 = 0 6 = +a/(1-a)66
	Here The is present for all elements.
	The second secon
1983	5: Commutative profiled Valuina
	1x6= a+6-06 = 6+a-60 = 6xa.
	Hence (a, x) is an abelian grp
(-x-3	Let Ra & C°, 60°, 120°, 180°, 240°, 300° } 4 ×
	low of so hat for a db in R, axbis
	(over all angular riolation corresponding to
	precedeive patabional by a + than by b.
	chow that (R, X) i'd of grp
1	show Ingl 421, 1> is an abelian grp.
A TOTAL OF THE PROPERTY OF THE	an chelian deb.
(3 14 1 p.)	La familia la familia de la contra dela contra de la contra dela contra de la contra dela contra de la contra del la contra d
3 47 1	THE STATE OF THE S
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	DEPT. CLASS DIV ROLL N.
151 19	BUBJECT
	Questions 1 2 3 4 6 6 7 8) is called a rive
	Marka obtained 2 alis fied:
	VIEWAL JAILWAL - PICT PONC (IT DEPL)
COM.	I SOMORPHISMS - AUTOMORPHISMS
1 1 1	The algebraic system (B, K) is isomorphic
D 87	to the algebraic system (A, A) if we can
-	ablain (B, x) from (A, x) by sumaming the
1	elements and or operations in (A. 7). In more
- #	termal way, we say had (B, X) is is morphic
-	to (A) if there exist a one to one onto
61	dunction of from A to B such that for all
1	a, and az in A
	f(a, xa2) = f(a,) x f (a2)
En Proces	
1 Sample	The function of it called an isa morphism
	morphic image of A.
130	troppic image of A.
	* a b c d * d B 7 8
EXI	$f(\alpha) = \alpha$
	C
4 0	1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1	(d) - 6
N. K.	(A, N) (B, D)
2 V.	A a b D Even add
61 Y 2	a a 6 Even Even bald
	LL a odd odd evan
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	× 0° 180° + 30 35
	0' 0 NO" 120 20 RE
	(C, \times) $(D, +)$
	Saannad by CamSaannar

An Isomerphism.
(A, ≠) to (A, ≥)
phism from an algebraic sys
(A to)
(A, +) is called an Automor
★)
-: f(a)=d; f(b)=C
- t(c)=p; t(q)=0.
Homomorphism :
Let (A.*) & (B.*) be two algebraic systems
Let if he a function from A onto B such
that for any a, + az in A
$f(a_1 \star a_2) = f(a_1) \star f(a_2)$
- Is called a homomorphism from (A, *)
(B, x) & (B, x) is called a homomorphic
image of (1, x)
4 x 3 3 8 E Z X 1 0 -1
Ex B = 1 2 2 P 2 2 7 8 1 1 1 0
δλββδεζ
<u>ζ</u> → -1 ε η η η ε ε ζ
12 6 6 5 5 5 E
- () x E = 1 () x 1 ()
1 (f (3)) = 1 (1 ()
XC
The state of the s
2 13 14 17
35,36
2 30
4 46 1
17
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L	Rings, Integral Domains, and Fields
L	
	Rings:
-	An algebraic system (A, +, .) is called a zing
-	if the following conditions are satisfied:
+	1. (A, +) is an abelian gray.
+	2. (A, 1) is a samigroup.
1	3. The operation is distributive over op" +
1	Integral Domains:
	An algebra (A.t) is called on Inte
	1. (A, t) is an abelian growt.
	2. The Op" is Commutative, Furthermore, if
	C = 0 4 C.a = C.b, then a=b, where o den-
	otes the additive identity.
-	3. The op" is the distributive over op" +
-	
+	Fields:
	(A, t,.) is called a field if:
-	1. (A,+) is an abelian group.
_	2. (A- 803, .) is an abelian group.
_	3. The op distributes over the op +.
1	
	11/2
	A A I
_	T -> Set at all interes
	-> set of all integer
100	y.(z. (+), (0)
_	(001)00
	(006)00 = 20(600
_	8 (90)
	THE RESERVE AND ADDRESS OF THE PROPERTY OF THE