5. unit

1) Problem on composition table

2Q) Roots of the equation $x^4 = 1$ show that it is a equal to multiplication

3Q) Show that cube roots of unity form a group w.r.t to multiplication.

4Q) State and prove lagragians theorem on cosets

statement

proof:

5Q) Prove that indentity element in group is unique in group

6Q) Prove that inverse element in group is unique

7Q) $(a^{-1})^{-1} = a$

8Q) $(ab)^{-1} = b^{-1}a^{-1}$

4Q compulsory

→ Q_1 is set of ~~natural numbers except (1)~~.

9Q) Q_1 is the set of rational numbers except 1. $a * b = a + b - ab$, $a, b \in Q_1$, Q_1 is an infinite abeline group.

10Q) Prove that the set of non singular matrices of order 2/2 is a group but not an abelian group with respect multiplications.

non singular $\det \neq 0$

sol) $G = \left\{ \begin{bmatrix} a & b \\ c & d \end{bmatrix}_{2\times 2} \right/$ all two 2/2 matries in set operation is multiplicat

* closure: $A = \begin{bmatrix} a_1 & b_1 \\ c_1 & d_1 \end{bmatrix}$, $B = \begin{bmatrix} a_2 & b_2 \\ c_2 & d_2 \end{bmatrix} \in G$ belong

$A \cdot B = \begin{bmatrix} a_1a_2 + b_1c_2 & a_1b_2 + b_1b_2 \\ c_1a_2 + d_1c_2 & c_1b_2 + d_1d_2 \end{bmatrix}$

real nums add and mult we get real numbers

$|A| \neq 0$, $|B| \neq 0$

$|AB| = |A| \cdot |B|$

$\neq 0$

$AB \in G$.

Associative: 3 elements

$A, B, C \in G$

We know that matrix multiplication is associative

$(AB)C = A(BC)$

Ass property is true

Identity: $\begin{bmatrix} a & b \\ c & d \end{bmatrix} \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$

$I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ is the identity element

$|I| = 1 - 0 = 1 \neq 0 \quad I \in G$

Inverse: let $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}_{2\times 2} \in G$

$ad - bc \neq 0$

$A^{-1} = \frac{\operatorname{adj} A}{|A|} = \frac{1}{ad-bc} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$

$\begin{bmatrix} d & -c \\ -b & a \end{bmatrix}$ cofactor $= A^{-1}$ is exist $AA^{-1} = I$

$A^{-1} \in G$

A^{-1} is two 2×2 matrix

$|A^{-1}| = \frac{1}{ad-bc}\{da - bc\}$

$= 1 \neq 0$

$A^{-1} \in G$,

For True we have to prove all

In case of ~~All~~ false we have to do one

1) commutative property $AB \neq BA$

$A = \begin{bmatrix} -1 & 0 \\ 0 & 2 \end{bmatrix}, \quad B = \begin{bmatrix} 3 & 2 \\ -1 & 1 \end{bmatrix}$

$3 + 2 = 5$

$AB = \begin{bmatrix} -3 & -2 \\ -2 & 2 \end{bmatrix}$

$BA = \begin{bmatrix} -3 & 4 \\ 1 & 2 \end{bmatrix}$

$AB \neq BA$

commutative property is not true so it is a group but not an abelian group.

* 4 unit:

1) Hasse Diagrams

a) $(D_{36}, |)$ positive divisors of 36

$\{1, 2, 3, 4, 6, 9, 12, 18, 36\}$

b) $(D_{56}; |)$

2) Subset relation, $A = \{a\}, C$ (or) $A = \{1\}$

$A = \{a, b\}, C \quad A = \{1, 2\}$

$A = \{a, b, c\}\ C$

$A = \{a, b, c, d\}\ C$

3) What is compatability relation, write the procedure to find maximal compatability blocks

* A reflexive and symmetric is known as compatability.
* maximal compatability finding procedure

4) Prove that it is equivalence relation.

a) $(a,b)\ R\ (c,d)$ iff $ad = bc$

reflex, symm, transitive

b) $(a,b)\ R\ (c,d)$ iff $a+b = b+c$

5) $f(x) = \_\_\_\_ \quad g(x) = \_\_\_\_$ function

1) $g \circ f$ 2) $f \circ g$

3) $g \circ f = \frac{x}{\quad}$

find a, b, c values find chayale

6) functions to find inverse of function $f(x)$

one one, onto exist then it is

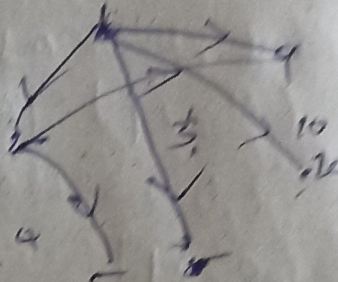
Domain Codomain

Graph theorem

$X = \{1, 2, 5, 9, 10\}$, $R = \{x, y \mid x < y\}$

$R = \{(1,2)(1,5)(1,9)(1,10)(2,5)(2,9)(2,10)(5,9)$
$(5,10)(9,10)\}$

digraph representation
matrix form



3 unit. Z values are below,

1) Normal distribution

2) Assuming that 50% of all engineering students are good in sciences. Determine among 18 students
1) Exactly 12
2) Atleast 12 are good in science.
Using Normal distribution.

sol ÷ 50% are good in science

$n = 18$

$p = \frac{50}{100} = 0.5$ $\quad$ $\left.\begin{matrix} p = q \\ p \neq q \end{matrix}\right\}$ two for

$q = 1 - p = 0.5$

$P(X = 12)$ $\quad$ $p = q \rightarrow z = \frac{x - \mu}{\sigma}$

$\mu = np = 18 \times 0.5 = 9$

$\sigma = \sqrt{npq} = \sqrt{18 \times 0.5 \times 0.5}$

$= \sqrt{}$

$z = \frac{x - \mu}{\sigma}$ find

$= \frac{12 - 9}{}$

$P(z = \ )$
2.1