Set 1:

Question 1:

Given system of equations:

2x1+x2+2x3+x4=6

6x1−6x2+6x3+12x4=364x

1+4x2+3x3−3x4=−12x

1+2x2−x3+x4=10

Matrix form:

A= 2 1 2 1

6 −6 6 12

4 4 3 −3

2 2 −1 1

B= 6

36

−1

10

Solution using elimination method:

x1 =1.6

x2 =1.3

x3 =−0.9

x4 =3.3

Question 2:

**100th Term of an AP**

For the 100th term:

a100=a+99d

(a2+99d)−(a1+99d)=100

a2−a1=100

**1000th Term of an AP**

Similarly,:

a1000=a+999d

**Difference Between 1000th Terms**

(a2+999d)−(a1+999d)=a2−a1

(a2+999d)−(a1+999d)=100

Question 3:

**Number of People Who Read at Least One Newspaper**

Using the principle of inclusion and exclusion,

∣H∪T∪I∣=∣H∣+∣T∣+∣I∣−∣H∩T∣−∣H∩I∣−∣T∩I∣+∣H∩T∩I|

Substituting the given values:

∣H∪T∪I∣=25+26+26−11−9−8+3

∣H∪T∪I∣=52

the number of people who read at least one of the newspapers is **52**.

**Number of People Who Read Exactly One Newspaper**

To find the number of people who read exactly one newspaper:

Exactly one=(∣H∣−(∣H∩T∣+∣H∩I∣−∣H∩T∩I∣))+(∣T∣−(∣T∩H∣+∣T∩I∣−∣H∩T∩I∣))+(∣I∣−(∣I∩H∣+∣I∩T∣−∣H∩T∩I∣))

Substituting the given values:

Exactly one=(25−(11+9−3))+(26−(11+8−3))+(26−(9+8−3))

Exactly one=(25−17)+(26−16)+(26−14)

Exactly one=8+10+12

Exactly one=30

Set 2:

Question 4:

We need to show that:

p→(q→r)≡(p∧q)→r*p*→(*q*→*r*)≡(*p*∧*q*)→*r*

**Truth Table**

| **p*p*** | **q*q*** | **r*r*** | **q→r*q*→*r*** | **p→(q→r)*p*→(*q*→*r*)** | **p∧q*p*∧*q*** | **(p∧q)→r(*p*∧*q*)→*r*** |
| --- | --- | --- | --- | --- | --- | --- |
| T | T | T | T | T | T | T |
| T | T | F | F | F | T | F |
| T | F | T | T | T | F | T |
| T | F | F | T | T | F | T |
| F | T | T | T | T | F | T |
| F | T | F | F | T | F | T |
| F | F | T | T | T | F | T |
| F | F | F | T | T | F | T |

1. **Column 4**: q→r*q*→*r*
2. **Column 5**: p→(q→r)*p*→(*q*→*r*)
3. **Column 6**: p∧q*p*∧*q*
4. **Column 7**: (p∧q)→r(*p*∧*q*)→*r*

**=>**

p→(q→r)≡(p∧q)→r*p*→(*q*→*r*)≡(*p*∧*q*)→*r*

Question 5:

Number of mangoes in each range:

* + - 50 – 52: Midpoint = 51
    - 53 – 55: Midpoint = 54
    - 56 – 58: Midpoint = 57
    - 59 – 61: Midpoint = 60
    - 62 – 64: Midpoint = 63

Number of boxes in each range:

* + - 50 – 52: 15 boxes
    - 53 – 55: 110 boxes
    - 56 – 58: 135 boxes
    - 59 – 61: 115 boxes
    - 62 – 64: 25 boxes

1. :

Total mangoes=(51×15)+(54×110)+(57×135)+(60×115)+(63×25)

Total mangoes=765+5940+7695+6900+1575=22875

**=>**

Total boxes=15+110+135+115+25=400

Mean=Total mangoes

Total boxes=22875/400=57.19

Question 6:

**Graph Theory Concepts**

**Walk**

A **walk** in a graph is a sequence of vertices and edges, where each edge's endpoints are the preceding and following vertices in the sequence. A walk can have repeated vertices and edges.

**Path**

A **path** is a walk in which all vertices and edges are distinct. In other words, a path does not repeat any vertices or edges.

**Circuit**

A **circuit** is a closed walk, meaning it starts and ends at the same vertex. In a circuit, vertices and edges can be repeated, but the starting and ending vertex must be the same.

**Regular Graph**

A **regular graph** is a graph where each vertex has the same number of neighbors. If every vertex has degree k*k*, then the graph is called a k*k*-regular graph. For example, in a 3-regular graph, each vertex is connected to exactly three other vertices.

**Complete Connected Graph**

A **complete graph** is a graph in which there is an edge between every pair of vertices. In other words, every vertex is connected to every other vertex by a unique edge. A complete graph with n*n* vertices is denoted by Kn*Kn*​.

**Mathematical Explanation**

1. **Walk**:
   * Example: In a graph with vertices A,B,C,D*A*,*B*,*C*,*D*, a walk could be A→B→C→A→D*A*→*B*→*C*→*A*→*D*.
2. **Path**:
   * Example: In the same graph, a path could be A→B→C→D*A*→*B*→*C*→*D*, with no repetitions.
3. **Circuit**:
   * Example: A circuit could be A→B→C→A*A*→*B*→*C*→*A*.
4. **Regular Graph**:
   * Example: In a 3-regular graph with vertices A,B,C,D,E*A*,*B*,*C*,*D*,*E*, each vertex is connected to exactly three other vertices.
5. **Complete Graph**:
   * Example: In a complete graph K4*K*4​ with vertices A,B,C,D*A*,*B*,*C*,*D*, there is an edge between every pair of vertices.