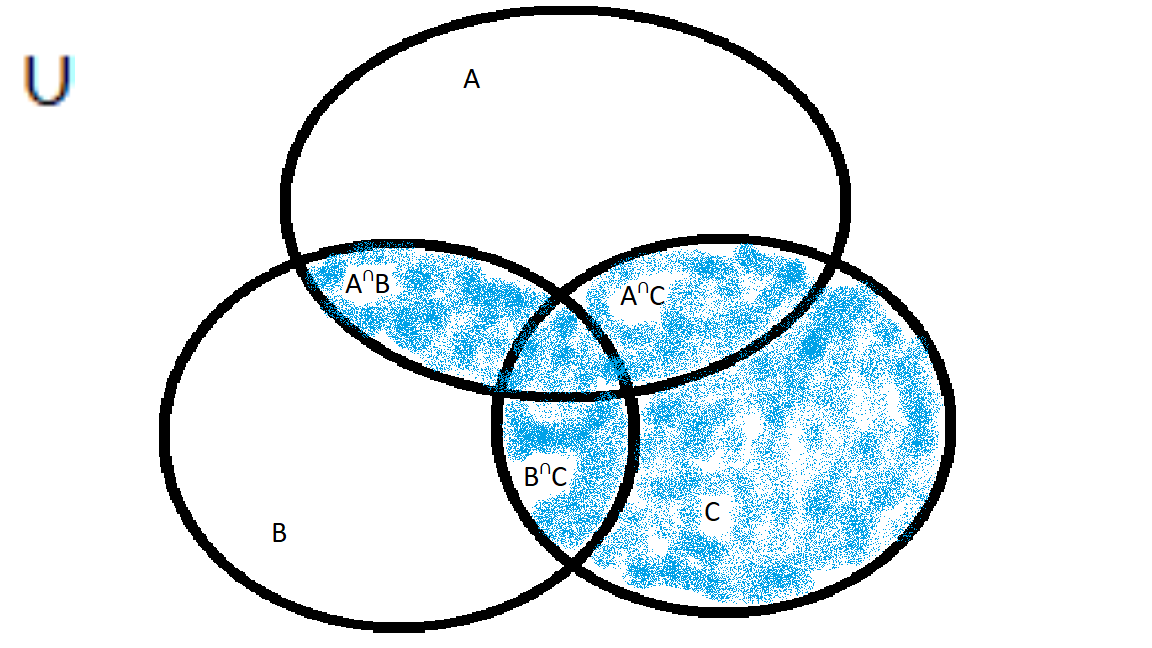
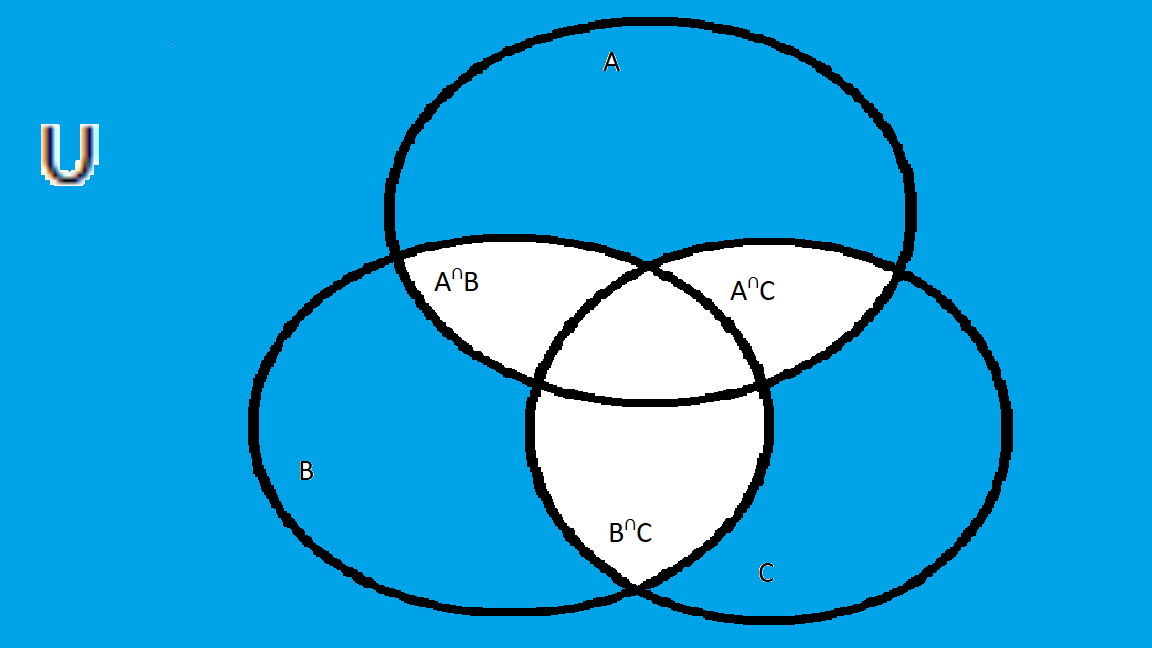
**Problem 1: Venn Diagrams**

1.)



2.)



3.)

Diagram, venn diagram

Description automatically generated

**Problem 2: Proof of Laws**

1.) prove absorption law by twice-applied universal generalization

Case 1:

Consider an element x

Definition of Union

Case 1.1:

Case 1.1 Definition of intersection

Case 1.2 Definition of

Any case of Universal Generalization

Case 2:

Consider an element x

Without loss of generality

Case2.1:

Case 2.1: Definition of Intersection

Case 2.2:

Case 2.2: Definition of Union

Case 2.2: Definition of Union

2.) prove associative law by membership table

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
| Y | Y | Y | Y | Y | Y | Y | Y |
| Y | Y | N | N | Y | N | N | Y |
| Y | N | Y | N | N | N | N | Y |
| Y | N | N | N | N | N | N | Y |
| N | Y | Y | Y | N | N | N | Y |
| N | N | N | N | N | N | N | Y |
| N | N | Y | N | N | N | N | Y |
| N | Y | N | N | N | N | N | Y |

**Problem 3: Proof of Equalities**

1.) Prove

Consider an element x

Definition of Union

Case 1.1:

Definition of Union

Case 1.2:

Definition of Union

Universal generalization

2.)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **A** | **B** | **C** |  |  |  |
| Y | Y | Y | Y | Y | Y |
| Y | Y | N | N | Y | Y |
| Y | N | Y | N | N | Y |
| Y | N | N | N | N | Y |
| N | Y | Y | N | N | Y |
| N | Y | N | N | N | Y |
| N | N | Y | N | N | Y |
| N | N | N | N | N | Y |

3.)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **A** | **B** | **C** |  |  |  |  |
| Y | Y | Y | N | N | N | Y |
| Y | Y | N | Y | N | N | Y |
| Y | N | Y | N | Y | N | Y |
| Y | N | N | Y | N | N | Y |
| N | Y | Y | N | N | N | Y |
| N | Y | N | N | N | N | Y |
| N | N | Y | N | Y | N | Y |
| N | N | N | N | N | N | Y |

4.)

Consider an element x

Definition of Union and Relative Complacent

Definition of Union and relative complacent

Case 1.2

Definition of Union and relative complacent

Universal Generalization

Consider an element x

Definition of Union

Case 2.1:

Definition of Union, S = any set

S = any set

Case 2.2

Definition of Union, S = any set

S = any set

Universal Generalization

**Problem 4: Set Equality Laws**

Distributive

Inverse

Identity

Distributive

Inverse

Identity

**Problem 5: Disproof**

is not always true

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **A** | **B** |  |  |  |
| Y | Y | N | N | Y |
| Y | N | Y | N | Y |
| N | Y | N | Y | N |
| N | N | N | N | Y |