# Abstract

The following project is solely written regarding scalar (dot) product of vectors. It is the geometrical interpretation of the scalar product. The following also includes the special cases as well as the properties of dot product. Angle between the vectors, length of vector, it's scalar projection, etc are also included along with their geometrical representation. Refrences were taken from varioujs websites and text book as cited below. The following pages mainly demonstrate how geometrical interpretation of dot product and it's properties are carried out.

# 1 Objective :

To write four compound statements by using two simple mathematical statements.

# 2 Procedure/ Explanation :

In any triangle ABC,

p : $a = b\cos C + c\cos B$

q : $b = c\cos A + a\cos C$

Here, p and q are two simple statements. Both of them are true mathematical statements regarding projection law in a triangle. The compound statements that can be formed using statements p and q are as follows:

## 2.1 p $\wedge$ q

$a = b\cos C + c\cos B$ AND $b = c\cos A + a\cos C$

Truth table:

| p | q | p $\wedge$ q |
|---|---|---|
| T | T | T |

## 2.2 p $\vee$ q

$a = b\cos C + c\cos B$ OR $b = c\cos A + a\cos C$

Truth table:

| p | q | p $\vee$ q |
|---|---|---|
| T | T | T |

### 2.3 $\backsim$p $\vee$ q

$a \neq b\cos C + c\cos B$ OR $b = c\cos A + a\cos C$

Truth table:

| $\backsim$p | q | $\backsim$p $\vee$ q |
|---|---|---|
| F | T | T |

### 2.4 p $\Rightarrow$ $\backsim$q

IF $a = b\cos C + c\cos B$, THEN $b \neq c\cos A + a\cos C$

Truth table:

| p | $\backsim$q | p $\Rightarrow$ $\backsim$q |
|---|---|---|
| T | F | F |

## 3 Observation:

For any two true simple statements p and q, the compound statements (p $\wedge$ q), (p $\vee$ q) and ($\backsim$p $\vee$ q)are true and the statement (p $\Rightarrow$ $\backsim$q) is found to be false.

## 4 Conclusion:

Two simple mathematical statements can be used to form a number of compound statements by using the logical connectives conjuction ($\wedge$), disjunction ($\vee$), negation ($\backsim$), implication ($\Rightarrow$) and equivalence ($\Leftrightarrow$). The resultant statements may be either 'True' or 'False' depending upon the original simple statements.

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