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LINEAR ALGEBRA OF KRONECKER DELTA

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Abstract

We generating dual basis of Kronecker delta. We have to use trigonometry term in Kronecker delta to apply degree of trigonometry formatting the Kronecker delta. The trigonometry degree of 0° and 90° is exactly form the kronecker delta .then another degree 30°,45°, 60°, … is approximately value to form the Kronecker delta.

Keywords

Linear function, dual basis, Kronecker delta, trigonometry

Introduction

In mathematics on dual basis of $\{v_1,v_2,v_3,....v_n\}$ be a basis of v over k. Let $u_1, u_2.........u_n \in v^*$ be the linear function defined by,

$$\Psi_i(v_i) = \begin{cases} 1, & = \\ 0, & \neq \end{cases}$$

Then $\{\Psi_1,\Psi_2,......\Psi_n\}$ is a basis of v*. The basis $\{\Psi_j\}$ is called dual basis. we also shall that the basis $\{\Psi_j\}$ is dual to $\{v_j\}$

When the mapping Ψ_j are well defined and unique the symbol $_{ij}$ is called Kronecker delta.

Kronecker delta

The Kronecker delta is a function of two variables, usually just non – negative integers. The Kronecker delta appears naturally in many areas of mathematics, physics and engineering.

Trigonometry

Trigonometry is a branch of mathematics that studies relationships between side lengths and angles of triangles.

Result and Discussion

The Kronecker delta of trigonometry term

Theorem-1

Statement:

Let {(1, 0,(0,1)} be a basis of the vector space and if G_1 and G_2 be the dual basis

If we use Kronecker delta of trigonometry term to apply 0° 90° then we have to prove $G_1(x,y)=1$ and $G_2(x,y)=0$,where $x,y \in v$

Proof:

Consider the general term,

$G_1(x,y) = \cos x + \sin y$ → (1)

$G_2(x,y) = \cos x \text{ X } \sin y$ → (2)

We have to prove $G_1(x,y) = 1$ and $G_2(x,y) = 0$

Put $x,y = 90°$

From (1) we have,

$G_1(x,y) = \cos \quad + \sin$

$= \cos(90°) + \sin(90°)$

$= 0+1$

$G_1(x,y) = 1$

From (2), we have,

$G_2(x,y) = \cos(90°) \sin(90°)$

$= 0 \text{ X } 1$

$G_2(x,y) = 0$

The Kronecker delta of trigonometry term applied 90° hence proved the

$G_1(x,y) = 1$, and $G_2(x,y) = 0$.

Put $x = 0°$

From (1), we have

$G_1(x,y) = \cos(0°) + \sin(0°)$

$= 1+0$

$= 1$

From (2),

$G_2(x,y) = \cos(0°) \sin(0°)$

$= 1\text{X}0$

$= 0$

The kronecker delta of trigonometry term applied 0° hence proved the $G_1(x,y) = 1$ and $G_2(x,y) = 0$.

Theorem – 2

Let {(1,0),(0,1)} be a basis of the vector space and if G_1 and G_2 be the dual basis

If we use Kronecker delta of trigonometry term to apply 30° 45° then we have to prove $G_1(x,y) = 1$ and $G_2(x,y) = 0$

,where x ,y ϵ v

Proof:

Consider the general term,

$G_1(x,y) = \cos x + \sin y$ → (1)

$G_2(x,y) = \cos x \text{ X } \sin y$ → (2)

We have to prove $G_1(x,y) = 1$ and $G_2(x,y) = 0$

Put x,y = 30°

From (1), we have

$G_1(x,y) = \cos(30°) + \sin(30°)$

= √ + _

= √_

≃ 0.43

= 0

The Kronecker delta of trigonometry term to applied 30° hence proved the $G_1(x,y) = 1$ and $G_2(x,y) = 0$

Put = 45°

From (1), we have

$G_1(x,y) = \cos \quad + \sin$

$= \cos(45°) + \sin(45°)$

=√ +√

= √

= √ √ √

$= \sqrt{2} \simeq 1.41$

$G_1(x,y) = 1$

From(2), we have

$G_2(x,y) = \cos(45°) \sin(45°)$

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= √ X√

— —

= _ ≃0.5

$G_2(x,y) = 0$

The Kronecker delta of trigonometry term to applied 45° hence proved the $G_1(x,y) = 1$ and $G_2(x,y) = 0$

Theorem – 3

Let {(1,0),(0,1)} be a basis of the vector space and if G_1 and G_2 be the dual basis

If we use Kronecker delta of trigonometry term to apply 60° then we have to prove $G_1(x,y)=1$ and $G_2(x,y)=0$,where x,y ϵ v

Proof:

Consider the general term,

$G_1(x,y) = \cos x + \sin y$ → (1)

$G_2(x,y) = \cos x \text{ X } \sin y$ → (2)

We have to prove $G_1(x,y) =1$ and $G_2(x,y) = 0$

Put x,y = 60°

From (1), we have

$G_1(x,y) = \cos(60°) + \sin(60°)$

= + √

= √ ≃ 1.36

$G_1(x,y) = 1$

From (2), we have

$G_2(x,y) = \cos(60°) \sin(60°)$

= X √

= √ ≃0.43

$G_2(x,y) = 0$

The Kronecker delta of trigonometery term to applied 60° hence proved the $G_1(x,y) = 1$ and $G_2(x,y) = 0$.

Conclusion

We have to generating dual basis of Kronecker delta, using trigonometry term applied trigonometry degree of $0°$ $90°$ exactly hence proved the Kronecker delta.

And then another degree of $30°$, $45°$, $60°$ … …. also hence proved the Kronecker delta. but $0°$ $90°$ is only exact value of dual basis then another degree is approximate value.

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References

[1]. K.P.GUPTA (1988) Linear Algebra

Pragathi prakashan publication Meerut

India limited.

[2]. R. D. Sharma & Ritu jain

j. k. International publishing house pvt . ltd, 2010.