GOA COLLEGE OF ENGINEERING

"Bhausaheb Bandodkar Technical Education Complex"

Experiment No: 2

Orthogonal Vectors

Aim: To check if two vectors are orthogonal or not

Theory:

Two vectors are called orthogonal if their inner product is 0, as is the case for the two vectors (2,5,0)and(0,0,17): (2,5,0)*(0,0,17)=0+0+0=0. But also vectors like (3,–2,4) and (–2,3,3) are orthogonal: (3,–2,4)*(–2,3,3)=–6–6+12=0.

By contrast, the vectors (1,2,3) and (4,2, –6) are not orthogonal (the inner product is –10), and (1, 2, 3) and (4, 2, –3) are "almost" orthogonal, with their inner product being –1 (which is "close" to zero).

Code:

```
#include<iostream>
using namespace std;
int main()
{

   int a[20],b[20], n, i, innerProd = 0;
   cout<<"Enter␣the␣length␣of␣the␣two␣vectors:␣";
   cin>>n;
   cout<<"Enter␣the␣vector␣A:␣";
   for(i=0; i < n; i++)

     cin>>a[i];
   cout<<"Enter␣the␣vector␣B:␣";
   for(i=0; i < n; i++)

cin>>b[i];

   cout<<endl<<"Inner␣Product␣=␣";
   for(i = 0; i < n; i++)
   {

     cout<<a[i]<<"*"<<b[i]<<"␣";
     if(i != n-1)

        cout<<"+␣";
     innerProd = innerProd + a[i]*b[i];

}

cout<<endl<<"␣␣␣␣␣␣␣␣␣␣␣␣␣=␣"<<innerProd<<endl;
   if(innerProd == 0)
```

```
    cout<<"Inner␣product␣of␣A␣and␣B␣is␣0.␣Therefore,␣vectors␣are␣orthogonal"<<
        endl;

  else
    cout<<"Inner␣product␣of␣A␣and␣B␣is␣not␣0.␣Therefore,␣vectors␣are␣not␣

        orthogonal"<<endl;
  return 0;

}
```

Output:

```
Enter the length of the two vectors: 2
Enter the vector A: 1 0
Enter the vector B: 0 1

Inner Product = 1*0 + 0*1 = 0

Inner product of A and B is 0. Therefore, vectors are orthogonal
```

Conclusion: A program to check if two vectors are orthogonal or not was successfully written and executed.