Name: Idaye Tamunonengiofori Peniel.

Department: 19/ENG06/027.

Course Code: MAT 102.

**Question**

1. If A=2i–j, B= 3i+j-11k and C= 4i+4j-5k, find the following:
2. -3A+7B-8C
3. If K= 2A+4B-C, find the direction cosine of K.
4. A×(B×C)
5. (3A× B) (A×2B)
6. A-2B-C
7. Define Perpendicular and Co-planar vectors.

**Solutions**

**(1)**

A=2i–j, B= 3i+j-11k and C= 4i+4j-5k

**(I)**

-3A+7B-8C= -3(2i-j)+7(3i+j-11k)-8(4i+4j-5k)

= -6i+3j+21i+7j-77k-32i-32j+40k

= (-6+21-32)i +(3+7-32)j +(-17+40)k

= -17i-22j-37k.

**(II)**

K= 2A+4B-C

= 2(2i-j) +(3i+j-11k)

= 4i-2j+12i+4j-44k

= 16i+2j-44k

=

=

Direction Cosine of K= +-

**(III)**

A×(B×C)= ?

(B×C)= (3i+j-11k)×(4i+4j-5k)

=

=[(-5)(-44)]i – [(15)-(-44)]j +[(12-4)]k

= (-55+44)i-(-15+44)j+8k

= (39i-29j+8k)

A×(B×C)= (2i-j)×(39i-29j+8k)

=

= (-8-0)i -(16-0)j +[(-58-(-39)]k

A×(B×C) = -8i-16-19k

**(IV)**

(3A×B) (A×2B)

3A= 3(2i-j+0k)

= (6i-3j+0k)

3A×B=

= i(33-0) –j(-66-0) +k(6+9)

(3A×B)= 33i+66j+15k

2B= 2(3i+j-11k)

= (6i+2j-22k)

(A×2B)=

= i(22+0) –j(-44+0) +k(4+6)

(A×2B)= 22i +44j +10k

(3A×B)(A×2B)= (33i+66j+15k)( 22i +44j +10k)

= (3322)i.i +(6644)j.j +(1510)k.k

= 726+2904+150

=3780

**(V)**

(A-2B-C)= (2i-j) -2(3i+j-11k) –(4i+4j-5k)

= (2i-j)-6i-2j+22k-4i-4j+5k

= (2-6-4)i +(-1-2-4)j +(22+5)k

= -8i-7j+27k.

**(2)**

**Co-planar vectors** are vectors which are parallel to the same plane, or lie on the same plane.

A vector is said to be coplanar if their supports are parallel to the same plane.

Conditions For Co-planarity Of Vectors

* If the scalar triple product of any three vectors is zero then, they are Co-planar.
* If any three vectors are linearly dependent then, they are Co-planar.
* Vectors are Co-planar if among them no more than two vectors are linearly independent vectors.

**Perpendicular Vectors**: Two vectors and are perpendicular if and only if their scalar product is equal to zero.

= ABCos

= AB Cos90

Since Cos90 = 0

= 0

Vectors and are perpendicular if and only if = 0