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MAT 102

19/ENG04/046.

1) a) $-3A+7B-8C$

$-3(2i-j)+7(3i+j-11k)-8(4i+4j-5k)$

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

$=-7i-22j-37k$

b) $k=2A+4B-C$

$=(4i-2j)+(12i+4j-44k)-1(4i+4j-5k)$

$=(4i+12i-4i)+(-2j+4j-44j)+(-44k+5k)$

$k=12i-42j-39k.$

$|k|=\sqrt{12^2+(-42)^2+(39)^2}.$

$|k|=\sqrt{144+1764+1521}=58.5$

$\cos\alpha=12/58.6=0.20$

$\cos\beta=-42/58.6=-0.72$

$\cos\gamma=-39/58.6=-0.62$

c) $A\times(B\times C)$

$B\times C=\begin{vmatrix} i & j & k \\ 3 & 1 & -11 \\ 4 & 4 & -5 \end{vmatrix}$

$=|-5-44|i-|-15-44|j+|12-4|k$

$=-49i+59j+8k$

$A\times(B\times C)=\begin{vmatrix} i & j & k \\ 2 & -1 & 0 \\ -49 & 59 & 8 \end{vmatrix}$

$=|-8-0|i-|16+49|j+|-50-118|k$

$=-8i-65j-168k$

d) $3A=3(2i-j)=6i-3j$

$2B=2(3i+j-11k)=6i+2j-22k$

$(3A\times B)=\begin{vmatrix} i & j & k \\ 6 & -3 & 0 \\ 3 & 1 & -11 \end{vmatrix}$

$=|33-0|i-|0+66|j+|6+9|k$

$=33i-66j+15k$

$(A\times 2B)=\begin{vmatrix} i & j & k \\ 2 & 1 & 0 \\ 6 & 2 & -22 \end{vmatrix}$

$=|-22-0|i-|-44-0|j+|4-6|k$

$=-22i+44j-2k$

$(3A\times B).(A\times 2B)$

$(33i-66j+15k)(-22i+44j-2k)$

$=11i-22j+13k$

e) $A-2B-C$

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

$=-8i-7j+27k$

2) -A perpendicular vector is one whose dot product with another equals to one.

-Coplanar vector is one whose scalar triple product with another is equals to one.