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<div align="center">MAT 102</div>

$A = 2i - j$, $B = 3i + j - 11k$ and $C = 4i + 4j - 5k$

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

$$\Rightarrow -3A = -3(2i - j)$$
$$= -6i + 3j$$

$$7B = 7(3i + j - 11k)$$
$$21i + 7j - 77k$$

$$-8C = -8(4i + 4j - 5k)$$
$$= -32i - 32j + 40k$$

$$\therefore -3A + 7B - 8C = (-6i + 3j) + (21i + 7j - 77k) - (32i + 32j - 40k)$$
$$(15i + 10j - 77k) - (32i + 32j - 40k)$$
$$= (-17i - 22j - 37k)$$

2) if $k = 2A + 4B - C$, find the direction Cosine of k

$$\Rightarrow 2A = 2(2i - j)$$
$$= (4i - 2j)$$

$$4B = 4(3i + j - 11k)$$
$$= (12i + 4j - 44k)$$

$$\therefore 2A + 4B - C = (4i - 2j) + (12i + 4j - 44k) - (4i + 4j - 5k)$$
$$= (16i + 2j - 44k) - (4i + 4j - 5k)$$
$$k = (12i - 2j - 39k)$$

Magnitude of $k = \sqrt{12^2 + (-2)^2 + (39)^2}$
$$= \sqrt{1539} \approx 39$$

$$\cos\alpha = \frac{12}{39} \qquad \cos\beta = \frac{-2}{39} \qquad \cos\gamma = \frac{-39}{39}$$

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

$$\therefore (2i - j) \times ((3i + j - 11k) \times (4i + 4j - 5k))$$
$$= 9i - 15j + 13k$$