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Computer Engineering
MAT 102

$$\begin{aligned} \text{a) } & -3A + 7B - 8C \\ & = -3(2i - j) + 7(3i + j + 11k) - 8(4i + 4j - 5k) \\ & = -6i + 3j + 21i + 7j + 77k - 32i + 32j + 40k \\ & = -6i - 32i + 21i + 3j + 7j - 32j + 77k + 40k \\ & = -17i + 22j + 117k \end{aligned}$$

$$\begin{aligned} \text{b) } & A \times (B \times C) \\ & = 2i - j \times (3i + j + 11k) \times (4i + 4j - 5k) \\ & = 2i - j \times (12i^2 + 4j^2 - 55k^2) \\ & = 24i^3 - 4j^3 - 55k^2 \end{aligned}$$

$$\begin{aligned} \text{c) } & (3A \times B) \cdot (A \times B) \\ & = (3(2i - j) \times (3i + j + 11k)) \cdot (2i - j \times (3i + j + 11k)) \\ & = (6i - 3j \times 3i + j + 11k) \cdot (2i - j \times (6i + 2j + 22k)) \\ & = (9i^2 - 3j^2 + 11k)(12i^2 - 2j^2 + 22k) \\ & = 108i^4 - 6j^4 - 242k^2 \\ & = 59i^4 - 3j^4 - 121k^2 \end{aligned}$$

$$\begin{aligned} \text{d) } & A - B - C \\ & = 2i - j - 2(3i + j + 11k) - 4i + 4j - 5k \\ & = 2i - j - 6i + 2j - 22k - 4i + 4j - 5k \\ & = 2i - 6i - 4i - j - 2j + 4j - 22k - 5k \\ & = -8i - 7j - 27k \end{aligned}$$

2) a) Two vectors A & B are perpendicular if and only if their scalar product is equal to zero.
b) Coplanar vectors are the vectors which lie in the same plane formed by any two axes in the coordinate geometry.