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MAT 102

$$1) A = 4i + j - 2k$$

$$B = 3i - 2j + k$$

$$C = i - 2k$$

$$a) (A - 2B) \times C$$

$$A - 2B = 4i + j - 2k - 2(3i - 2j + k)$$

$$= 4i + j - 2k - 6i + 4j - 2k$$

$$= -2i + 5j - 4k$$

$$(A - 2B) \times C = \begin{vmatrix} i & j & k \\ -2 & 5 & -4 \\ 1 & 0 & -2 \end{vmatrix}$$

$$= i \begin{vmatrix} 5 & -4 \\ 0 & -2 \end{vmatrix} - j \begin{vmatrix} -2 & -4 \\ 1 & -2 \end{vmatrix} + k \begin{vmatrix} -2 & 5 \\ 1 & 0 \end{vmatrix}$$

$$= i(10 - 0) - j(4 + 4) + k(0 - 5)$$

$$= 10i - 8j - 5k$$

$$b) (2 - 3B)$$

$$2C = 2i - 4k$$

$$3B = 9i - 6j + 3k$$

$$(2C \times 3B) = \begin{vmatrix} i & j & k \\ 2 & 0 & -4 \\ 9 & -6 & 3 \end{vmatrix}$$

$$i \begin{vmatrix} 0 & -4 \\ -6 & -3 \end{vmatrix} - j \begin{vmatrix} -3 & 2 \\ 9 & 3 \end{vmatrix} + k \begin{vmatrix} 2 & 0 \\ 9 & -6 \end{vmatrix}$$

$$= i(0 - 24) - j(6 + 36) + k(-12 + 6)$$

$$= -24i - 42j - 12k$$

$$A \times (2C \times 3B) = \begin{vmatrix} i & j & k \\ 4 & 1 & -2 \\ -24 & -42 & -12 \end{vmatrix}$$

$$i \begin{vmatrix} 1 & -2 \\ -42 & -12 \end{vmatrix} - j \begin{vmatrix} 4 & 2 \\ -24 & -12 \end{vmatrix} + k \begin{vmatrix} 4 & 1 \\ -24 & -42 \end{vmatrix}$$

$$i(-12 - 84) - j(-48 - 48) + k(-168 + 24)$$

$$= 96i + 96j - 144k$$

$$2) A = Pi - 6j - 3k$$

$$B = 4i + 5j - k$$

$$C = i + -3j + 2k$$

$$A \cdot (B \times C) = \begin{vmatrix} P & -6 & 3 \\ 4 & 3 & -1 \\ 1 & -3 & 2 \end{vmatrix} = 0$$

$$0 = P \begin{vmatrix} 3 & -1 \\ -3 & 2 \end{vmatrix} + 6 \begin{vmatrix} 4 & -1 \\ 1 & 2 \end{vmatrix} - 3 \begin{vmatrix} 4 & 3 \\ 1 & -3 \end{vmatrix}$$

$$0 = P(6 - 3) + 6(8 + 1) - 3(12 - 3)$$

$$0 = 3P + 54 + 45$$

$$0 = 3P + 99$$

$$0 = 3P + 99$$

$$P = -33$$