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MAT 102

1. a) If  $A = 4i + j - 2k$ ,  $B = 3i - 2j + k$  and  $C = i - 2k$ . Find

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

$$\begin{array}{c|ccc} (A - 2B) & i & j & k \\ \hline 2(3i - 2j + k) & 4 & -2 & 2 \\ \hline 1 & 6 & -4 & 2 \end{array}$$

$$1(2+8) - j(8-6) - k(8-6)$$

$$1(2-8) - j(8-6) + k(-6-6)$$

$$-6i - 20j + -6i - 20j - 22k$$

$$\begin{array}{c|ccc} (A - 2B) \times C & i & j & k \\ \hline & -6 & -20 & -22 \\ \hline & 1 & -2 & 0 \end{array}$$

$$1(0-44) - j(0-22) + k(12-20)$$

$$-44i + 22j - 8k$$

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

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

$$3B = 3(3i - 2j + k) = 9i - 6j + 3k$$

$$\begin{array}{c|ccc} (2C \times 3B) & i & j & k \\ \hline & 2 & -4 & 0 \\ \hline & 9 & -6 & 3 \end{array}$$

$$1(-12-0) - j(6-0) + k(-12-(-36))$$

$$-12i - 6j + 24k$$

2.)  $A = pi - 6j + k$ ,  $B = 4i + 3j - k$  and  $C = 14j + 2k$

Find the value of  $p$  for which  $A, B, C$  are co-planar

$$A \cdot B \times C = 0$$

$$\begin{array}{c|ccc} -P & -6 & -3 & \\ \hline 4 & 3 & -1 & \\ \hline 1 & -3 & 2 & \end{array}$$

$$P \begin{array}{c|cc} 3 & -1 & \\ \hline -3 & 2 & \end{array} \quad -(-6) \begin{array}{c|cc} 4 & -1 & \\ \hline 1 & 2 & \end{array} \quad +(-3) \begin{array}{c|cc} 4 & 3 & \\ \hline 1 & -3 & \end{array}$$

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

$$3P + 42 + 45 = 0$$

$$3P + 87 = 0$$

$$3P = -87$$

$$3 \quad 3$$

$$P = -29$$