1. $A = 5i - 7j - 6K \quad B = j + 4K \quad C = 9i - 4j + K$

$-8(A+B) = -8(5i - 7j + j - 6K + 4K)$

$= -8(5i - 6j - 2K)$

$= -40i + 48j + 16K$

$(C-A) = (9i - 4j + K) - (5i - 7j - 6K)$

$= 9i - 4j + 1K - 5i + 7j + 6K$

$= 4i + 3j + 7K$

$-8(A+B) \cdot (C-A) = (-40i + 48j + 16K) \cdot (4i + 3j + 7K)$

$= -160 + 144 + 112$

$= 96.$

2. $x = -3t \quad y = t^2 \quad z = 4t^3$ at $t = 1.$

$(\bar{r})t = (-3t)i + (t^2)j + (4t^3)K$

tangent vector.

$(\bar{r}')t = -3i + (2t)j + (12t^2)K$ where $t=1$ $(\bar{r}')t = -3i + 2j + 12K$

$|r| = \sqrt{(-3)^2 + (2)^2 + (12)^2}$

$|r| = \sqrt{157}$

~~where~~

Unit vector tangent $= \dfrac{r}{|r|} = \dfrac{-3i + 2j + 12K}{\sqrt{157}}.$

3. $x = -8t^2 \quad y = t^2 - 4t \quad z = t + 1$

~~$(\bar{r})t = (-8t^2)i$~~

$(\bar{r})t = -8t^2 + t^2 - 4t + t + 1$

$(\bar{r})t = -7t^2 - 3t + 1$

$(v)t = (\bar{r}')t = (-14t - 3)\ ms^{-1}$

$a(t) = (\bar{r}'')t =$ acceleration $= -14\ ms^{-2}$

4. $A = i + 2j - 4k$ $B = 2i - 3j + k$ $C = 4j - 3k$

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

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

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

$$(A \times B) = i(2 - 12) - j(1 + 8) + k(-3 - 4)$$

$$= -10i - 9j - 7k$$

$$(A \times B) \times C = \begin{vmatrix} i & j & k \\ -10 & -9 & -7 \\ 0 & 4 & -3 \end{vmatrix}$$

$$(A \times B) \times C = i \begin{vmatrix} -9 & -7 \\ 4 & -3 \end{vmatrix} - j \begin{vmatrix} -10 & -7 \\ 0 & -3 \end{vmatrix} + k \begin{vmatrix} -10 & -9 \\ 0 & 4 \end{vmatrix}$$

$$= i(27 + 28) - j(30) + k(-40)$$

$$= 45i - 30j - 40k$$