

$$8. \quad u = 3i - j + 2k$$

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

$$w = i + j + k$$

$$w \times v = \begin{vmatrix} i & j & k \\ 1 & 1 & 1 \\ 4 & 1 & -5 \end{vmatrix}$$

$$w \times v = -6i + 9j - 3k$$

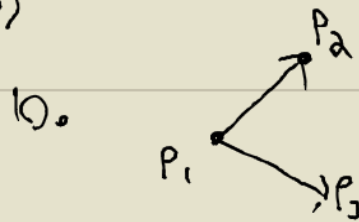
$$u \cdot (w \times v)$$

$$= [3i - j + 2k] \cdot [-6i + 9j - 3k]$$

$$= 3(-6) + (-1)(9) + (2)(-3)$$

$$= -18 - 9 - 6$$

$$= \boxed{-33}$$



$$P_1 (-1, 0, 3)$$

$$P_2 (3, 5, -4)$$

$$P_3 (4, -1, 3)$$

$$9. \quad u = 3i - j + 2k$$

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

$$u \rightarrow \begin{matrix} \mathbf{i} & \mathbf{j} & \mathbf{k} \\ P_1 & P_2 & \end{matrix}$$

$$u = \langle 3 - (-1), 5 - 0, -4 - 3 \rangle$$

$$u = 4i + 5j - 7k$$

$$v \rightarrow \begin{matrix} \mathbf{i} & \mathbf{j} & \mathbf{k} \\ P_1 & P_3 & \end{matrix}$$

$$v = \langle 4 - (-1), -1 - 0, 3 - 3 \rangle$$

$$v = 5i - j$$

$$u \times v = \begin{vmatrix} i & j & k \\ 4 & 5 & -7 \\ 5 & -1 & 0 \end{vmatrix}$$

$$= \boxed{3i + 23j + 7k}$$

(1ST)

$$u \times v = \begin{vmatrix} i & j & k \\ 4 & 5 & -7 \\ 5 & -1 & 0 \end{vmatrix}$$

$$u \times v = -7i - 35j - 29k$$

(2ND)

$$\|u \times v\| = \sqrt{(-7)^2 + (-35)^2 + (-29)^2}$$

$$= \sqrt{2115}$$

$$= \sqrt{3 \cdot 3 \cdot 5 \cdot 47}$$

$$= \boxed{3\sqrt{235}}$$

$$\begin{array}{c} 2115 \\ \swarrow \searrow \\ 3 \quad 705 \\ \quad \swarrow \searrow \\ \quad 3 \quad 235 \\ \quad \quad \swarrow \searrow \\ \quad \quad 5 \quad 47 \end{array}$$