

$$1a) \begin{pmatrix} -4 \\ 7 \\ 5 \end{pmatrix} - \begin{pmatrix} 3 \\ 4 \\ -2 \end{pmatrix} = \begin{pmatrix} -7 \\ 3 \\ 7 \end{pmatrix}$$

$$\vec{AB} = -7i + 3j + 7k$$

$$b) |\vec{AB}| = \sqrt{7^2 + 3^2 + 7^2} \\ = \sqrt{107}$$

$$2 \quad |3i + kj + 2k| = 7$$

$$\sqrt{3^2 + k^2 + 2^2} = 7$$

$$\sqrt{13 + k^2} = \sqrt{49}$$

$$13 + k^2 = 49$$

$$k^2 = 36$$

$$k = \underline{\underline{\pm 6}}$$

$$3a) \begin{pmatrix} -8 \\ 2 \\ -1 \end{pmatrix} - \begin{pmatrix} -5 \\ 7 \\ -3 \end{pmatrix} = \begin{pmatrix} -3 \\ -5 \\ 2 \end{pmatrix}$$

$$\vec{AB} = -3i - 5j + 2k$$

$$b) \frac{\sqrt{3^2 + 5^2 + 2^2}}{\underline{\underline{\sqrt{38}}}}$$

$$4) \begin{pmatrix} -5 \\ 7 \\ 2 \end{pmatrix} + \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} -2 \\ -3 \\ 6 \end{pmatrix}$$

$$x = 3$$

$$y = -10$$

$$z = 4$$

$$5a) \begin{pmatrix} 8 \\ -5 \\ 4 \end{pmatrix} - \begin{pmatrix} 6 \\ 2 \\ -1 \end{pmatrix} = \begin{pmatrix} 2 \\ -7 \\ 5 \end{pmatrix}$$

$$\vec{BC} = 2i - 7j + 5k$$

$$b) \frac{\sqrt{6^2 + 2^2 + 1^2}}{\sqrt{41}}$$

$$6) \begin{pmatrix} -5 \\ 7 \\ 4 \end{pmatrix} + \begin{pmatrix} 4 \\ 6 \\ -2 \end{pmatrix} + \begin{pmatrix} 3 \\ -5 \\ 3 \end{pmatrix} = \begin{pmatrix} 2 \\ 8 \\ 5 \end{pmatrix}$$

$$2i + 8j + 5k$$

$$7) \vec{PQ} = \begin{pmatrix} 5 \\ 4 \\ 3 \end{pmatrix} - \begin{pmatrix} -3 \\ 10 \\ -7 \end{pmatrix} = \begin{pmatrix} 8 \\ -6 \\ 10 \end{pmatrix}$$

$$\vec{RS} = \begin{pmatrix} 8 \\ -3 \\ 3 \end{pmatrix} - \begin{pmatrix} -4 \\ 6 \\ -12 \end{pmatrix} = \begin{pmatrix} 12 \\ -9 \\ 15 \end{pmatrix}$$

$$\begin{aligned} \vec{PQ} &= 8i - 6j + 10k \\ &= 2(4i - 3j + 5k) \end{aligned}$$

$$\begin{aligned} \vec{RS} &= 12i - 9j + 15k \\ &= 3(4i - 3j + 5k) \end{aligned}$$

$$\vec{PQ} = \frac{2}{3} \vec{RS} \quad \text{same direction } \therefore \text{parallel.}$$