

CORRIGÉ DU DM N°1

Correction 1.

$$1. \frac{x_A + x_B}{2} = \frac{-2 + 1}{2} = -\frac{1}{2} \text{ et } \frac{y_A + y_B}{2} = \frac{0 + 4}{2} = 2 \text{ et } \frac{z_A + z_B}{2} = \frac{3 - 1}{2} = 1 \text{ donc } \boxed{I(-\frac{1}{2}; 2; 1)}.$$

$$\text{De même, } \frac{-2+2}{2} = 0 \text{ et } \frac{0+1}{2} = \frac{1}{2} \text{ et } \frac{3+5}{2} = 4 \text{ donc } \boxed{J(0, \frac{1}{2}, 4)}.$$

$$2. \begin{aligned} AC &= \sqrt{(x_C - x_A)^2 + (y_C - y_A)^2 + (z_C - z_A)^2} & BJ &= \sqrt{(0 - 1)^2 + (\frac{1}{2} - 4)^2 + (4 - (-1))^2} \\ &= \sqrt{(2 - (-2))^2 + (1 - 0)^2 + (5 - 3)^2} & &= \sqrt{1 + (-\frac{7}{2})^2 + 25} \\ &= \sqrt{16 + 1 + 4} & &= \sqrt{\frac{4}{4} + \frac{49}{4} + \frac{100}{4}} \\ &= \boxed{\sqrt{21}} & &= \sqrt{\frac{153}{4}} \\ & & &= \boxed{\frac{\sqrt{153}}{2}} \end{aligned}$$

$$\|\vec{u}\| = \sqrt{4^2 + (-2)^2 + 6^2} = \boxed{\sqrt{56}}$$

$$3. \overrightarrow{AB} = \begin{pmatrix} 1 - (-2) \\ 4 - 0 \\ -1 - 3 \end{pmatrix} = \begin{pmatrix} 3 \\ 4 \\ -4 \end{pmatrix} \quad \overrightarrow{BC} = \begin{pmatrix} 2 - 1 \\ 1 - 4 \\ 5 - (-1) \end{pmatrix} = \begin{pmatrix} 1 \\ -3 \\ 6 \end{pmatrix}$$

$$\overrightarrow{AC} = \begin{pmatrix} 3 - (-2) \\ 1 - 0 \\ 5 - 3 \end{pmatrix} = \begin{pmatrix} 4 \\ 1 \\ 2 \end{pmatrix} \quad 2\overrightarrow{AB} - 3\overrightarrow{AC} = 2 \begin{pmatrix} 3 \\ 4 \\ -4 \end{pmatrix} - 3 \begin{pmatrix} 4 \\ 1 \\ 2 \end{pmatrix} = \begin{pmatrix} -6 \\ 5 \\ -14 \end{pmatrix}$$

$$4. \vec{u} = \begin{pmatrix} 4 \\ -2 \\ 6 \end{pmatrix} \text{ donc } -\frac{3}{2}\vec{u} = \begin{pmatrix} -6 \\ 3 \\ -9 \end{pmatrix}.$$

$$\text{Et } \overrightarrow{AD} = \begin{pmatrix} x_D - (-2) \\ y_D - 0 \\ z_D - 3 \end{pmatrix}.$$

$$\text{Or on veut } \overrightarrow{AD} = -\frac{3}{2}\vec{u}.$$

$$\text{Donc } \begin{cases} x_D + 2 = -6 \\ y_D - 0 = 3 \\ z_D - 3 = -9 \end{cases} \text{ donc } \begin{cases} x_D = -6 - 2 \\ y_D = 3 \\ z_D = -9 + 3 \end{cases} \text{ donc } \boxed{D(-8; 3; -6)}.$$

$$5. \vec{w} = \frac{1}{4}\vec{u} - \frac{2}{3}\vec{v} = \frac{1}{4} \begin{pmatrix} 4 \\ -2 \\ 6 \end{pmatrix} - \frac{2}{3} \begin{pmatrix} -1 \\ 3 \\ -12 \end{pmatrix} = \begin{pmatrix} 1 \\ -\frac{1}{2} \\ \frac{3}{2} \end{pmatrix} + \begin{pmatrix} \frac{2}{3} \\ \frac{2}{3} \\ 8 \end{pmatrix} = \begin{pmatrix} \frac{5}{3} \\ \frac{3}{5} \\ -\frac{2}{19} \\ \frac{2}{2} \end{pmatrix}$$