Prequise Test

Exercice 1:

In an orthonormal reference frame be (O, $\vec{i}, \vec{j}, \vec{k}$), we consider three vectors

$$\vec{U} = \vec{i} + \vec{j} + \vec{k} \quad , \qquad \vec{V} = 2\vec{i} - \vec{j} + 2\vec{k} \qquad , \qquad \vec{W} = -2\vec{k}$$

1. Draw the three vectors $\vec{U}$, $\vec{V}$ and $\vec{W}$

2. Calculate the magnitudes $\|\vec{U}\|$, $\|\vec{V}\|$ and $\|\vec{W}\|$

3. Determine the components of the unit vector $\vec{u}$ carried by $\vec{U}$

4. Graphically give the vector $(\vec{U} - \vec{V})$ and calculate its modulus.

5. Calculate :

  a) - The scalar product $\vec{U} . \vec{V}$

  b) - The cross (vectorial) product $\vec{U} \wedge \vec{V}$

  c) - The double cross product $(\vec{U} \wedge \vec{V}) \wedge \vec{W}$

  d) - The mix product $(\vec{V} \wedge \vec{W}) . \vec{U}$

  e) - Determine the angle between $\vec{U}$ and $\vec{V}$

Exercice 2:

Let the scalar field be $f(x, y, z) = 3x^2 y + y^2 z^2$ and the vectorial field given by :

$$\vec{V}(x, y, z) = xz^2 \vec{i} + (2x^2 - y)\vec{j} + yz^2 \vec{k}$$

Calculate :

$\overrightarrow{grad}$ (f)

div $(\vec{V})$

$\overrightarrow{curl}$ $(\vec{V})$ $(\overrightarrow{rot}$ $(\vec{V}))$