

## Task K 2

$$\textcircled{1} \quad A(3.5, 0, 0) \quad \vec{B}(1.75, 3.5, 0)$$

$$\vec{i} = \vec{e}_1 = (1, 0, 0)$$

$$\vec{j} = \vec{e}_2 = (0, 1, 0)$$

$$\vec{k} = \vec{e}_3 = (0, 0, 1) \quad \vec{s}$$

$$\det = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 3.5 & 0 & 0 \\ 1.75 & 3.5 & 0 \end{vmatrix} = \vec{i} \cdot 0 \cdot 0 +$$

$$3.5^2 \cdot \vec{k} + \vec{j} \cdot 0 \cdot 1.75 - (\vec{k} \cdot 0 \cdot 1.75 +$$

$$3.5 \cdot 0 \cdot \vec{i} + 3.5 \cdot \vec{j} \cdot 0) = 12.25 \vec{k}$$

$$= (0, 0, 12.25)$$

$$\textcircled{1} \quad A(3, -3, 1) \quad \vec{B}(4, 9, 3)$$

$$\det = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 3 & -3 & 1 \\ 4 & 9 & 3 \end{vmatrix} = \vec{i} \cdot (-9) + 27 \vec{k} +$$

$$4 \vec{j} - ((-12) \vec{k} + 9 \vec{i} + 9 \vec{j}) =$$

$$= -5 \vec{j} + (\cancel{27}) \vec{k} - 18 \vec{i} =$$

$$= (-18, -5, \cancel{27} 39)$$

$$\Rightarrow \sqrt{18^2 + 5^2 + 39^2} = \sqrt{1820}$$

$$\approx 43.2435$$

$$\textcircled{-} A(3, -3, 1) \quad B(-12, 12, -4) \rightarrow$$

$$\det = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 3 & -3 & 1 \\ -12 & 12 & -4 \end{vmatrix} = \vec{i}(12) + 36\vec{k} =$$

$$12\vec{j} - (36\vec{k} + 12\vec{i} - 12\vec{j}) =$$

$$= 0 \cdot \vec{i} + 0 \cdot \vec{j} + 0 \cdot \vec{k} = \vec{0}$$

$$\Rightarrow \boxed{0+0+0} = 0$$

### Task 3

$$\rightarrow A (-1.75, -1.75, -3)$$

$$\rightarrow B (1.75, -1.75, -3)$$

$$\rightarrow C (0, 1.75, -3)$$

$$\rightarrow E_1 (1.75 + 1.75, -1.75 + 1.75)$$

$$\Rightarrow E_1 (3.5, 0, 0) \parallel B - A$$

$$\rightarrow E_2 (1.75, 3.5, 0) \parallel C - A$$

$$\det = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 3.5 & 0 & 0 \\ 1.75 & 3.5 & 0 \end{vmatrix} = \vec{i} \cdot 0 + 12.25 \vec{k}$$

$$+ \vec{j} \cdot 0 \cdot 1.75 - (\vec{k} \cdot 0 \cdot 1.75 + i \cdot 0)$$

$$+ 3.5 \cdot 0 \cdot \vec{j}) = 12.25 \vec{k} = \cancel{12.25}$$

$$= (0, 0, 12.25)$$

$$\vec{N} \text{ (unit)} = \frac{(0, 0, 12.25)}{\sqrt{12.25^2 + 12.25^2 + 12.25^2}} = (0, 0, 1)$$

$$|\vec{r}_n| = \sqrt{0^2 + 0^2 + 12.25^2} = 12.25$$

Area formula for triangle:

$$\frac{1}{2} |\text{cross}(\vec{a}, \vec{b})| = \frac{1}{2} |\vec{\text{result}}|$$

$$|\vec{v}| = \text{length}$$

$$\Rightarrow \text{Area: } 12.25 = 6.125$$

$$\theta \vec{A}(0, 0, -1) \quad \vec{B}(1, 0, 1) \\ \vec{C}(-1, 0, 1)$$

$$\vec{E_1}(1, 0, 2) \quad \vec{E_2}(-1, 0, 2)$$

$$\det \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 1 & 0 & 2 \\ -1 & 0 & 2 \end{vmatrix} = -2\vec{i} - 2\vec{j} = (0, -4, 0)$$

$$|\vec{W}| = 4$$

$$\vec{N} \left( \frac{0}{4}, \frac{-4}{4}, \frac{0}{4} \right) = (0, -1, 0)$$

Area: 2

$$\vec{A} (0.56, 1.11, 1.23)$$

$$\vec{B} (0.44, -2.368, -0.54)$$

$$\vec{C} (-1.56, 0.15, -1.92)$$

$$\vec{E}_1 (-0.12, -3.478, -1.77)$$

$$\vec{E}_2 (-2.12, -0.96, -3.0)$$

$$\det = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ \vec{i} & \vec{j} & \vec{k} \\ (\vec{E}_1) & (\vec{E}_2) & \end{vmatrix} = \vec{i} \cdot (3,478, 3) +$$

$$\vec{k} \cdot (0,12, 0,96) + \vec{j} (1,77, 2,12)$$

$$- (\vec{k} (3,478, 2,12) + \vec{i} (1,77,$$

$$0,96) + \vec{j} (0,12, 3)) =$$

$$= (0,2348, 3.3924, -7.258)$$

$$l_{en} = \sqrt{x^2 + y^2 + z^2} = \sqrt{140.48}$$
$$= 11.8525 = |\vec{N}|$$

$$\vec{N} \left( \frac{0.7348}{|\vec{N}|}, \frac{3.3924}{|\vec{N}|}, \frac{-7.258}{|\vec{N}|} \right)$$

$$\hat{\vec{n}} (0.737, 0.286, 0.612)$$

$$\text{Area: } \cancel{\sqrt{140.48}} \cdot \frac{\sqrt{140.48}}{4} \approx 6.11$$