Matematika 3
Vectors

Name

Dicha Zelianivan Arkana

NIM

2241720002

Class

2i

Department

Information Technology

Study Program

D4 Informatics Engineering

1 Questions

1. If $z_1 = 5_i - 2_j, z_2 = 3_i + 3_j, z_3 = 4_i - 1_j$, determine:

(a)

$$
\begin{aligned}
z_1 + z_2 + z_3 &= (5_i - 2_j) + (3_i + 3_j) + (4_i - 1_j) \\
&= (5_i + 3_i + 4_i) + (-2_j + 3_j - 1_j) \\
&= 12_i + 0_j \\
&= 12_i
\end{aligned}
$$

(b)

$$
\begin{aligned}
z_1 - z_2 - z_3 &= (5_i - 2_j) - (3_i + 3_j) - (4_i - 1_j) \\
&= (5_i - 3_i - 4_i) + (-2_j - 3_j + 1_j) \\
&= -2_i - 4_j
\end{aligned}
$$

2. If $\overline{OA} = 4_i + 3_j, \overline{OB} = 6_i - 2_j, \overline{OC} = 2_i - j$, determine $\overline{AB}, \overline{BC}, \overline{CA}$, and determine the lengths of the sides of triangle ABC.

$$
\begin{aligned}
\overline{AB} &= \overline{OB} - \overline{OA} \\
&= (6_i - 2_j) - (4_i + 3_j) \\
&= (6_i - 4_i) + (-2_j - 3_j) \\
&= 2_i - 5_j \\
\overline{BC} &= \overline{OC} - \overline{OB} \\
&= (2_i - j) - (6_i - 2_j) \\
&= (2_i - 6_i) + (-j + 2_j) \\
&= -4_i + j \\
\overline{CA} &= \overline{OA} - \overline{OC} \\
&= (4_i + 3_j) - (2_i - j) \\
&= (4_i - 2_i) + (3_j + j) \\
&= 2_i + 4_j
\end{aligned}
$$

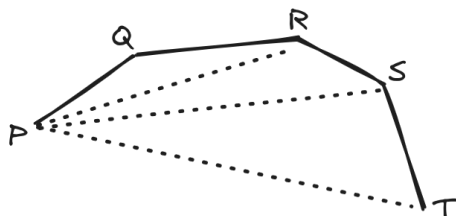The length of the triangle is calculated using the following formula:

$$\overline{AB} = \sqrt{(2)^2 + (-5)^2}$$
$$= \sqrt{4 + 25}$$
$$= \sqrt{29}$$
$$= 5.385$$
$$\overline{BC} = \sqrt{(-4)^2 + (1)^2}$$
$$= \sqrt{16 + 1}$$
$$= \sqrt{17}$$
$$= 4.123$$
$$\overline{CA} = \sqrt{(2)^2 + (4)^2}$$
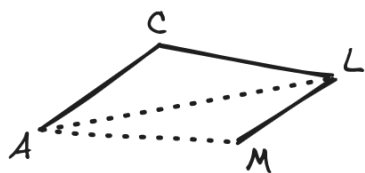$$= \sqrt{4 + 16}$$
$$= \sqrt{20}$$
$$= 4.472$$

3. Determine the result of adding this vector along with its image:

(a) $\overline{PQ} + \overline{QR} + \overline{RS} + \overline{ST}$
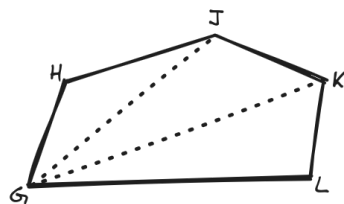

$$\overline{PQ} + \overline{QR} + \overline{RS} + \overline{ST} = \overline{PT}$$

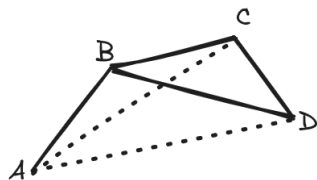(b) $\overline{AC} + \overline{CL} - \overline{ML}$

$$\overline{AC} + \overline{CL} - \overline{ML} = \overline{AM}$$

(c) $\overline{GH} + \overline{HJ} + \overline{JK} + \overline{KL} + \overline{LG}$

$$\overline{GH} + \overline{HJ} + \overline{JK} + \overline{KL} + \overline{LG} = 0$$

(d) $\overline{AB} + \overline{BC} + \overline{CD} + \overline{DB}$

$$\overline{AB} + \overline{BC} + \overline{CD} + \overline{DB} = \overline{AB}$$

Corrector: Al-Azhar