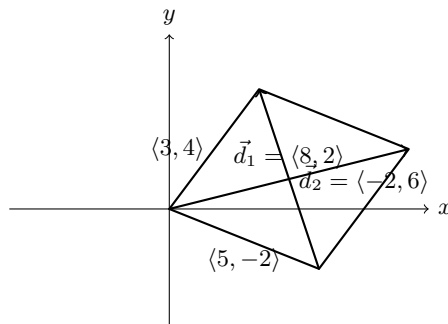


Question 7

The diagonals of a parallelogram are $\vec{d}_1 = \langle 8, 2 \rangle$ and $\vec{d}_2 = \langle -2, 6 \rangle$. Find possible adjacent side vectors.

Question 7 – Solution

Strategy Write every vector in matching component order. Perform scalar multiplication before addition or subtraction, then interpret the resulting components in the context of the problem.



Step 1 If adjacent sides are $\vec{a}, \vec{b}$, then $\vec{d}_1 = \vec{a} + \vec{b}$ and $\vec{d}_2 = \vec{a} - \vec{b}$.

Step 2 Add and divide by two: $\vec{a} = (\vec{d}_1 + \vec{d}_2)/2 = \langle 3, 4 \rangle$.

Step 3 Subtract and divide by two: $\vec{b} = (\vec{d}_1 - \vec{d}_2)/2 = \boxed{\langle 5, -2 \rangle}$. Thus one ordered pair is $\boxed{\langle 3, 4 \rangle, \langle 5, -2 \rangle}$.

Verification The result follows from the defining vector formulas used above, and each component, magnitude, or scalar condition has been checked against the information in the question.

Key idea Vector equations behave like ordinary algebra provided that every operation is performed component by component. A final component check is often the fastest verification.