

Please do not write on this exam paper and give it back at the end of the test

LOGICAL CONNECTIVE AND APPLICATIONS

On a mathematical forum, Mary asked the following question:

“For tomorrow, I have to do an exercise where they ask me to prove that ABCD is a parallelogram, I do not know how to do that.”

Teacher answers: “Do you know a sufficient statement so that ABCD is a parallelogram?”

Mary: “No!”

Tod: “ $\overrightarrow{AB} = \overrightarrow{DC}$ ”

Allan: “ $AB = CD$ ”

John: “ \overrightarrow{AB} and \overrightarrow{DC} are colinear to each other”

Lizzie: “(AB) and (BC) are parallel to each other”

Jerry: “ $\overrightarrow{AD} = \overrightarrow{BC}$ ”

Leo: “ $AC = AB + AD$ ”

1. Which of those statements are sufficient ?
2. Find some other ones.
3. Which of those statements are necessary ?
4. Find some other ones.
5. Complete the following sentences with “if”, “only if” or “if and only if”:
 - a) We have $x \in [2; 3] \dots \dots \dots x \in [1,99 ; 3,01]$.
 - b) $K \in [AB] \dots \dots \dots \overrightarrow{AK}$ and \overrightarrow{AB} are colinear to each other.
 - c) $\sin x \geq 0 \dots \dots \dots x \in [0; \pi]$.