

Subject 15

LOGIC

*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  $x \in [2; 3]$  ...  $x \in [1,99 ; 3,01]$ .
  - b)  $K \in [AB]$  ...  $\overrightarrow{AK}$  and  $\overrightarrow{AB}$  are colinear to each other.
  - c)  $\sin x \geq 0$  ...  $x \in [0; \pi]$ .