

Logic

1. MakeAwake WG asked students from a math course about their coffee consumption. However, the answers are very different.
 - (i) There is at least one student in this math class who drinks coffee.
 - (ii) All students in this math course drink coffee.
 - (iii) Not all students in this math course drink coffee.
 - (iv) All students in this math course do not drink coffee.
 - (v) There is not at least one student in this math course who drinks coffee.
 - (vi) There is not at least one student in this math course who does not drink coffee.
 - (vii) There is at least one student in this math course who does not drink coffee.
 - (viii) Not all students in this math course do not drink coffee.

Task:

- a) Examine which of the statements are equivalent.
 - b) At the very bottom of the questionnaire there is another answer:
 - (ix) At most, one student in this math class doesn't drink coffee.

Which of the above statements are equivalent to this answer? Give reasons for your decision.
2. a) Complete the following truth table:

| A | B | $\neg B$ | $A \vee \neg B$ | $\neg A \wedge \neg B$ | $\neg(A \Rightarrow B)$ | $A \wedge (A \Leftrightarrow B)$ | $\neg A \Leftrightarrow \neg B$ |
|-------|-------|----------|-----------------|------------------------|-------------------------|----------------------------------|---------------------------------|
| true | true | | | | | | |
| true | false | | | | | | |
| false | true | | | | | | |
| false | false | | | | | | |

- b) Using the truth table above, simplify the expression $(\neg A \wedge \neg B) \vee (A \wedge \neg B)$