University of Biskra

Faculty of science and technology module of mathematics 1

1st year LMD

Serie of exercise N°1

Exercise 1

A. Make truth table for the statements:

$P \vee Q \Rightarrow P \wedge Q$

$\overline{P \wedge Q}$ and $\bar{P} \vee \bar{Q}$ are logically.

B. Let P be a false assertion, Q a true assertion ad R a false assertion. What are the assertions true?

- ☐ Q and (P or R)
- ☐ P or (Q and R)
- ☐ Non (P and Q and R)
- ☐ (P or Q) and (Q or R)

C. Give the negation of each statement:

$\forall x \in R_+ \, \forall y \, R_+ \quad x + y > x.y$

$\forall x \in R \, \exists y \in R \quad x.y = 1$

D. Which assertions are true?

- ☐ $\forall x \in R \quad x^2 - x \geq 0$
- ☐ $\forall n \in N \quad n^2 - n$
- ☐ $\exists x < 0 \quad \exp(x) < 0$
- ☐ $\exists x > 0 \quad \sqrt{x} = x$

Attention: $x^2 - x$ is negative for $x = \frac{1}{2}$ for example!

Exercise 2

Prove that:

1. if n positive integer with $n^2 > 100$ then $n > 10$.
2. $\sqrt{3}$ is irrational.
3. Prove using mathematical induction the following statement:
   $\forall n \in N^* \; P(n) = 1 + 2 + 3 + \cdots + n = \frac{n(n+1)}{2}$

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