

1. Write the mathematical formulas corresponding to the following statements with the help of the following signs only: propositional connectives, quantifiers, variables varying through set a)  $\mathbb{N}$  b)  $\mathbb{R}$  and symbols indicated in brackets

a) even numbers have no odd  $multiples(\cdot, +, =, 1)$ 

b) there is no largest negative number (<, 0, =)

2. Is the following formula a tautology?

Transform it into DNF form (e.i.  $(x_1 \land x_2 \land x_3) \lor (..) \ldots \lor (...)$  where  $x_i$  are variable or their negations)  $[(p \Leftrightarrow q) \land r] \Rightarrow [(p \land q) \lor \sim q]$ 

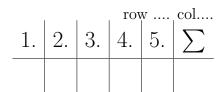
3. Prove or disprove a)  $\mathcal{P}(\emptyset) \in \mathcal{P}(\mathcal{P}(\emptyset))$  b)  $\mathcal{P}(\emptyset) \subseteq \mathcal{P}(\mathcal{P}(\emptyset))$ 

4. Proof by induction  $41|5 \cdot 7^{2(n+1)} + 2^{3n}$ 

5. Are the following equalities true. Prove the true one, find a counterexample for the false one.  $[A \setminus (B \cup C)] \cup (B \cap C) = [A \setminus (B \div C)] \cup [(B \cap C) \setminus A]$ 

 $[A \setminus (B \cup C)] \cup (B \cap C) = (A \cup B) \setminus (B \setminus C))$ 

Name .....



1. Write the mathematical formulas corresponding to the following statements with the help of the following signs only: propositional connectives, quantifiers, variables varying through set a)  $\mathbb{N}$  b)  $\mathbb{R}$  and symbols indicated in brackets

a) multiplex of odd numbers are not necessary  $odd(\cdot, +, 1, =)$ 

b) there is no smallest positive number (<, 0, =)

2. Is the following formula a tautology?

Transform it into DNF form (e.i.  $(x_1 \land x_2 \land x_3) \lor (..) \ldots \lor (...)$  where  $x_i$  are variable or their negations)  $[(p \Leftrightarrow q) \lor r] \Rightarrow [(p \lor q) \land \sim q]$ 

3. Prove or disprove a)  $\mathcal{P}(\emptyset) \in \mathcal{P}(\{\emptyset\})$  b)  $\mathcal{P}(\emptyset) \subseteq \mathcal{P}(\{\emptyset\})$ 

4. Proof by induction  $25|2^{n+2} \cdot 3^n + 5n - 4$ 

5. Are the following equalities true. Prove the true one, find a counterexample for the false one.  $[C \setminus (B \cup A)] \cup (B \cap A) = [C \setminus (B \div A)] \cup [(B \cap A) \setminus C]$ 

 $[C \setminus (B \cup A)] \cup (B \cap A) = (C \cup B) \setminus (B \setminus A))$