

Tentamen Schakelprogramma Wiskunde en Logica

January 29, 2014

Question 1 Please give your name, student number, and email address:

Question 2 Please paraphrase the following statements:

1. $A \subseteq B$,
2. $B \in \mathcal{P}(A)$ (or: $B \in 2^A$),
3. $A \cap B \neq \emptyset$.

Question 3 Which set is given by the following specification:

$$\{2n + 1 \mid n \in \mathbb{N}\}.$$

Question 4 A is a set with three elements. Suppose B is a subset of A . What can you say about the number of elements of B ?

Question 5 A is a set with five elements. f is a one-to-one function from A to B . How many elements can B have?

Question 6 A is set with four elements. The power set of A is the set of all subsets of A . How many elements does the power set of A have?

Question 7 \mathbb{N} is the set of natural numbers. How many elements does the power set of \mathbb{N} have? The same number of elements as \mathbb{N} ? More elements? But what does that mean?

Question 8 Which of the following relations are transitive? Symmetric? Reflexive?
(If not, give a reason)

1. $\{(1, 2), (2, 3), (3, 4)\}$.
2. $\{(1, 1), (1, 2), (1, 3), (2, 1), (2, 2), (3, 2), (3, 3)\}$.
3. $\{(1, 2), (2, 3), (3, 4), (1, 3), (2, 4), (1, 4)\}$.
4. $\{(1, 2), (2, 1)\}$.
5. $\{(1, 1), (2, 2)\}$.

Question 9 Give the transitive closures of each of the relations in question 8:

1. $\{(1, 2), (2, 3), (3, 4)\}^+ =$
2. $\{(1, 1), (1, 2), (1, 3), (2, 1), (2, 2), (3, 2), (3, 3)\}^+ =$
3. $\{(1, 2), (2, 3), (3, 4), (1, 3), (2, 4), (1, 4)\}^+ =$
4. $\{(1, 2), (2, 1)\}^+ =$
5. $\{(1, 1), (2, 2)\}^+ =$

Question 10 If c_t^v is substitution of v with t in c , then what are the results of the following substitutions?

1. $(\forall x Rxy)_z^y =$
2. $(\forall x \forall y (Rxy \vee Ryz))_y^x =$
3. $((\exists x Rxy) \wedge (\exists y Rxy))_y^x =$