
EE1001

Foundations of Digital Techniques

Logic

Exercise 2

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From Proposition to Predicate
Predicate Logic

Question 1

- Is the following argument valid?

$$\sqrt{2} > \frac{3}{2} \rightarrow (\sqrt{2})^2 > \left(\frac{3}{2}\right)^2$$

$$\sqrt{2} > \frac{3}{2}$$

$$2 > \left(\frac{3}{2}\right)^2$$

Question 2

- 1) If the 5G is adopted, then we can connect to the network on the rooftop.
- 2) The network covers either the area inside the campus or the basement.
- 3) If the network covers the area inside the campus, then 5G is used.
- 4) If the network covers the basement, then Wifi is adopted.
- 5) We cannot connect to the network on the rooftop.

Question: What is wireless technology of the network?

Question 3

- 1) If **S**uperhero exists, then Superhero is all-**p**owerful) and perfectly-**g**ood.
- 2) If Superhero is all-powerful, then he would be **a**ble to prevent crimes.
- 3) If Superhero is perfectly-good, then he would be **w**illing to prevent crimes.
- 4) If Superhero is able to and willing to prevent crimes, then there would be no crime.
- 5) There are **c**rimes.

Conclusion: Superhero does not exist.

Use inference rules and logical equivalence relation to determine the validity of the argument above.

Question 4

Consider “ $\forall x \in \mathbf{R}$, if $x^2 > 4$, then $x > 2$ ”.

- i) What is its negation?
- ii) Is its negation true?

Question 5

- 1) There is a course which every student scores an A
 - 2) There is a student scores A in all courses
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- i) Are these two arguments the same?
 - ii) Find out their negations.