

Logic-2

Tanya Khovanova

October 20, 2008

Student: Teacher, would you punish me for something I didn't do?

Teacher: No, why?

Student: I didn't do my homework.

Class Discussion

Negation. Using EVERY and THERE EXISTS.

Warm Up

Exercise 1. Jim is always happy for a whole day after he solves a problem at Tanya's math class. Tonight Jim is unhappy. Can we conclude that Jim didn't have Tanya's math class today or he didn't solve a single problem?

Exercise 2. Suspects A , B , and C are being questioned. The following facts are established: 1) Only A , B or C could have committed the robbery. 2) A never commits a crime alone. 3) C is innocent.

Is B guilty?

Problem Set

Exercise 3. Write the negations of the following statements:

1. All cats like hot dogs.
2. It is not true that today is Friday.
3. Some dogs eat fish.

4. $1 + 1 = 3$.
5. x is an irrational number.

Exercise 4. Are the following statements true:

1. Elephants can fly and $2 + 2 = 4$.
2. Men have three legs, or the Earth is round.
3. If 4 is a prime number, then $2 + 2 = 5$.
4. The Earth is square if and only if fishes can speak French.

Exercise 5. The day before a big storm my cat always sneezes. Today the cat sneezed. Will there be a storm tomorrow?

Exercise 6. A , B , and C are murder suspects. The following facts are established: 1) If A is not guilty or B is guilty, then C is guilty. 2) If A is not guilty, then C is not guilty. Is A guilty?

Exercise 7. “John has more than a thousand books,” said Pete. “No, he has less than one thousand books,” said Ann. “He, surely, has at least one book,” said Mary.

If only one statement is true, how many books John has?

Exercise 8. Folks living in Trueton always tell the truth. Those who live in Lieberg, always lie. People living in Alterborough alternate strictly between truth and lie. Once 911 got a night call: “Fire, help!” The operator couldn’t id the phone number, so he asked: “Where are you calling from?” “Lieberg.”

Assuming noone had overnight guests from another town, where should the firemen go?

Exercise 9. Assume the following is true: A sane person always takes an umbrella to fly a balloon. If you take an umbrella with you, you are guaranteed a sunny day. It is raining and I am flying in the balloon.

Can you conclude that I am insane?

Exercise 10. Each of the 4 dwarfs — Grumpy, Happy, Sleepy and Sneezzy — either always tells the truth or always lies. We heard the following conversation: Grumpy to Happy: “You are a liar!” Sleepy to Grumpy: “You are a liar yourself!” Sneezzy to Sleepy: “They are both liars. You are a liar too.”

Who is a truth-teller and who is a liar?

Exercise 11. A criminal is sentenced to death. He is offered the last word. He is allowed to make one statement. If the statement is true, the criminal will be put to the electric chair. If the statement is false, he will be hanged. Can you find a good piece of advice for this man?