

# Introduction to Logical Reasoning

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## Problem Set #5

Although I strongly suggest that you write out answers to all these problems, you do *not* have to turn in any written responses. You do, however, need to be prepared to do these types of problems, for questions on the weekly quizzes and exams will primarily be drawn from the problem sets. The solutions to these problems will be provided, so you can check your own work and seek help from me as necessary.

We will devote considerable time to these types of problems during the next in-class workshop. In order to make that workshop productive, please make a solid start on them. That way you can use the workshop to address the difficulties you are facing.

If you do the extra credit logic puzzle, you must turn in a computer-type-written solution at the beginning of class on Monday, October 10<sup>th</sup>.

### Instructions

Each of the following problems asks you to construct a deductive argument, on any subject of your choosing, with only two premises and a conclusion, which has the characteristics specified. Be sure to clearly explain why each proposition is either true or false, and why the argument itself is either valid or invalid.

### Problems

1. A valid argument with one true premise, one false premise, and a false conclusion.
2. A valid argument with one true premise, one false premise, and a true conclusion.
3. An invalid argument with two true premises and a false conclusion.
4. An invalid argument with two true premises and a true conclusion.
5. A valid argument with two false premises and a true conclusion.
6. An invalid argument with two false premises and a true conclusion.
7. An invalid argument with one true premises, one false premise, and a true conclusion.
8. A valid argument with two true premises and a true conclusion.

**Note:** There may a lot of exercises here. Do not feel obligated to do all of them. I often assign many exercises so that you have plenty of opportunities to practice the skills these exercises are trying to impart. I suggest doing just enough of them so that you are confident that you could use these skills on a quiz or an exam.

### Extra Credit Logic Puzzle

Early one day, Mr. Majnun, his wife Mrs. Layla, their son, and their daughter were having breakfast at a small restaurant. This is a small business with only one employee working at any given time, and this person had stepped out for a smoke. This morning, however, a gunshot and a scream were heard, and the employee ran back inside to discover that one member of the family had been murdered. The following statements are known to be true:

1. One family member was murdered.
2. Another family member committed the murder.
3. Yet another family member saw what happened.
4. And yet another family member gave the gun to the murderer.
5. The person who committed the murder is not the youngest family member.
6. The oldest person and the person who saw what happened are of the opposite sex.
7. The youngest person and the person murdered are of the opposite sex.
8. The person who gave the gun to the murderer is older than the person who was murdered.
9. The person who saw what happened and the person who gave the gun to the murderer are of the opposite sex.
10. Mr. Majnun is the oldest family member.

**Question:** Which family member committed the murder? Which one was murdered? Which one saw what happened? Which one gave the gun to the murderer?

To receive full credit you must justify your answer with a logical argument showing why you are 100% right. That is to say, this question has a definitive answer that can be justified without *any* guessing on your part.