

Part A: Consider the following propositions:

- p = "I (will) take the train to campus"
- q = "I (will) drive to campus"
- r = "It will be cloudy outside"
- s = "It will rain"
- t = "It will be windy outside"
- u = "The weather will be cold"

For one of the following sets of sentences, as assigned to your team:

- Translate the sentences into logical expressions.
- For each sentence, if possible, describe a situation in which the sentence is true, and describe a situation in which the sentence is false.

1. Either I will take the train to campus or it will rain.

It will rain, but it will not be windy outside.

If it will be windy out and the weather will be cold, then I will drive to campus.

2. If I drive to campus, then either it will rain or the weather will be cold.

The weather will not be cold, and it will not be cloudy outside.

Either I will take the train to campus or it will be cloudy outside.

3. Either it will rain, or it will not be cloudy outside.

If I take the train to campus, then I will not drive to campus.

It will not be cloudy outside and it will not rain.

Part B: For each of the following logical expressions, if possible, make up propositions p , q , r , etc., in English that make the expression true, and make up propositions that make the expression false.

- $p \wedge q$
- $p \vee \neg p$
- $(p \wedge q) \rightarrow r$
- $r \rightarrow (p \wedge q)$

Part C: Instead of knights (truth-tellers) and knaves (liars), suppose people from **Tracy** always tell the **Truth**, and people from **Livermore** always **Lie**. In each problem, we assume that each of A and B (and C, if present) is either from Tracy or from Livermore. For the problem your team has been assigned:

- Translate the given sentences into propositional logic, using the propositions a ="A is from Tracy", b ="B is from Tracy", and c ="C is from Tracy".
- Solve your assigned puzzle. You could use:
 - Rules of propositional logic
 - A truth table
 - An argument in ordinary English

1. Suppose A and B say:

A: B is from Livermore.

B: Either A is from Tracy or I am from Tracy.

Can you tell where A is from? If so, where? Can you tell where B is from? If so, where?

2. Suppose A and B say:

A: If B is from Tracy, then I am from Livermore.

B: A is from [inaudible].

That is, you can't hear the last word that B says, but it's either Tracy or Livermore. Can you tell where A and B are from? What did B say?

3. Suppose A, B, and C are there, and A and B say:

A: Both B and I are from Livermore.

B: C is from Livermore.

Can you tell where A, B, and C are all from?