

## Chapter Three Translation Problems Set 1: #1, #2

### WebCT Discussion

*Problem:* Using the following translation table, translate each of these English sentences into the formal language.

#### Translation Table:

**P:** It's raining

**Q:** It's cloudy

**R:** It's warm

#### English Sentences:

1. It's warm and it's not cloudy.
2. Either it's not raining or it's cloudy.

*Discussion:* Translation of the first sentence begins, as usual, by picking out the form phrases. Here there are two: “*and*” and “*not*”.

1. It's warm **and** it's **not** cloudy.

Putting these to one side leaves the form-free, subject matter sentences “It's warm” and “It's cloudy”. We replace each with its matching sentence letter, following the translation table.

- | <b>R</b>            | <b>Q</b>                                   |
|---------------------|--|
| 1. <u>It's warm</u> | <u>and</u> <u>it's not</u> <u>cloudy</u> . |

“Not” is translated by a tilde.

- | <b>R</b>  | <b>~Q</b> |
|---|-----------|
| 1. It's warm <del>and</del> it's <b>not</b> cloudy. |           |

“And is gluing together the two parts, into a conjunction. “And” is translated by the wedge (with matching outer parentheses).

$$(R \wedge \sim Q)$$

1. It's warm **and** it's not cloudy.

That completes the translation.

Translation of the second sentence starts the same way: picking out the form phrases, “*either... or*” and “*not*”. Putting those aside leaves the subject matter sentences “*It's raining*” and “*it's cloudy*”. We replace each with the appropriate sentence letter, following the translation table.

- |          |                      |          |
|----------|----------------------|----------|
| <b>P</b> |                      | <b>Q</b> |
|          | 2. <del>Either</del> |          |
- it's ~~not~~ raining ~~or~~ it's cloudy.

“*Not*” is translated by the tilde.

- |                            |                      |          |
|----------------------------|----------------------|----------|
| <b><math>\sim P</math></b> |                      | <b>Q</b> |
|                            | 2. <del>Either</del> |          |
- it's **not** raining ~~or~~ it's cloudy.

“*Either... or*” is gluing together these two parts: “*It's not raining*” and “*It's cloudy*”. “*Either... or*” is translated by the vel (with outer parentheses).

- $$(\sim P \vee Q)$$
2. **Either** it's not raining **or** it's cloudy.

This completes the translation.