

## Solutions to problem set 1

### Problem 1

Thank you.

### Problem 2 and 3

Please see solutions on the course web page.

### Problem 4. Translation

Translate the following sentences in English into propositional logic. For each sentence you should try to identify propositions that allow you to express as much structure in the sentence as possible.

- It is below freezing and snowing.  
Let  $F$  stands for below freezing and  $S$  for snowing.  
Translation:  $F \wedge S$
- It is below freezing but not snowing.  
Translation:  $F \wedge \neg S$
- If it is below freezing, it is also snowing.  
Translation:  $F \rightarrow S$
- It is either below freezing, or it is snowing, but it is not snowing if it is below freezing.  
Translation:  $(F \vee S) \wedge (F \rightarrow \neg S)$
- If it rains in the afternoon we will go shooping.  
Let  $R$  stands for the rain and  $G$  for go shopping.  
Translation:  $R \rightarrow G$
- We will go shopping only if it rains in the afternoon.  
Translation:  $G \rightarrow R$

- We will go shopping if and only if it rains in the afternoon.  
Translation:  $(G \rightarrow R) \wedge (R \rightarrow G)$