

## Exercises for 2.7

1. I say in the text that  $s_1 \supset s_2$  can be read as ‘ $s_1$  only if  $s_2$ ’. Explain why, given the truth table of  $s_1 \supset s_2$ , it makes sense to read it as ‘ $s_1$  only if  $s_2$ ’.
2. One way of reading  $s_1 \supset s_2$  that I do not give in the text is ‘ $s_2$  if  $s_1$ ’. Explain why this is also a good way of reading  $s_1 \supset s_2$ .
3. How could we say ‘ $s_1$  if and only if  $s_2$ ’ by utilizing the availability of  $\supset$ ?
4. Give the syntax tree and truth table of each of the following sentences.
  - (a)  $\neg P \vee Q$
  - (b)  $P \supset \neg\neg P$
  - (c)  $\neg\neg P \supset P$
  - (d)  $(P \vee Q) \supset R$
  - (e)  $(P \supset R) \wedge (Q \supset R)$
5. Show, using truth tables, that  $s_1 \supset s_2$  is logically equivalent to  $\neg s_1 \vee s_2$ .
6. Explain why the following is true: If  $s_1$  and  $s_2$  are logically equivalent, then  $s_1 \supset s_2$  is a tautology.