

## Exercises 5.10

### Exercise 5.10.1

Recall that  $\neg x$  is the negative of the Boolean variable  $x$ .

- Show that a single perceptron can learn the Boolean function  $y = x_1 \wedge \neg x_2$ , with some  $x_1, x_2 \in \{0, 1\}$ .
- The same question as in part *a* for the Boolean function  $y = x_1 \vee \neg x_2$ , with some  $x_1, x_2 \in \{0, 1\}$ .
- Show that a perceptron with one Boolean input,  $x$ , can learn the negation function  $y = \neg x$ . What about the linear neuron?
- Show that a perceptron with three Boolean inputs,  $x_1, x_2, x_3$ , can learn the negation function  $y = \neg x$ . What about  $x_1 \vee x_2 \vee x_3$ ?

### Exercise 5.10.2

Show that two finite linearly separable sets  $A$  and  $B$  can be separated by a perceptron with rational weights.

# SOLUTIONS