

Guideline

Homework for week 02.

Please submit your solutions in a single PDF on Brightspace.

If you are writing by hand, please ensure your handwriting is legible.

Multiple submissions are possible before the due time; the last submission will be graded.

Exercise 1 (points = 20)

Prove that the following are equivalent using truth tables:

1. Distributive Law

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

2. Absorption Law

- $p \vee (p \wedge q)$
- p

Exercise 4 (score = 80)

Use truth tables to determine whether the arguments below are valid. Explanation is needed (e.g. based on the truth table).

(1)

- Premises: $p \rightarrow q, \sim p \rightarrow \sim q$
- Conclusion: $p \vee q$

(2)

- Premises: $p \vee q, p \rightarrow \sim q, \sim r \rightarrow \sim p$
- Conclusion: r

(3)

- Premises: $p, \sim q \rightarrow \sim p, \sim q \vee r$
- Conclusion r

(4)

- Premises: $p \wedge q \rightarrow \sim r$, $p \vee \sim q$, $\sim q \rightarrow p$
- Conclusion: $\sim r$

(5)

- Premises: $p \rightarrow r$, $q \rightarrow r$
- Conclusion: $(p \vee q) \rightarrow r$

(6)

- Premises: $p \rightarrow (q \vee r)$, $\sim q \vee \sim r$
- Conclusion: $\sim p \vee \sim r$