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 2 (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 -> q, ~p -> ~q
- Conclusion: p $\vee$ q

(2)

- Premises: p $\vee$ q, p -> ~q, ~r -> ~p
- Conclusion: r

(3)

- Premises: p, ~q -> ~p, ~q $\vee$ r
- Conclusion r

(4)

- Premises: p$\wedge$q -> ~r, p $\vee$ ~q, ~q -> p
- Conclusion: ~r

(5)

- Premises: p -> r, q -> r
- Conclusion: (p \/ q) -> r

(6)

- Premises: p -> (q \/ r), ~q \/ ~r
- Conclusion: ~p \/ ~r