

2007 Spring CS204 Homework #1

1. Exercise 1.1.28

Construct a truth table for each of these compound propositions.

- (a) $p \rightarrow \neg p$
- (b) $p \wedge \neg p$
- (d) $(p \vee q) \rightarrow (p \wedge q)$
- (e) $(q \rightarrow \neg p) \wedge (p \vee q)$

2. Exercise 1.1.48

Express these system specifications using the propositions p “The user enters a valid password,” q “Access is granted,” and r “The user has paid the subscription fee” and logical connectives.

- (a) “The user has paid the subscription fee, but does not enter a valid password.”
- (b) “Access is granted whenever the user has paid the subscription fee and enters a valid password.”
- (c) “Access is denied if the user has not paid the subscription fee.”
- (c) “If the user has not entered a valid password but has paid the subscription fee, then access is granted.”

3. Exercise 1.2.14

Determine whether $(\neg p \wedge (p \rightarrow q)) \rightarrow \neg q$ is a tautology.

4. Show that $(p \vee q) \wedge r$ is logically equivalent to $p \vee (q \wedge r)$.

5. [Modification of Exercise 1.2.22] Show that $(p \rightarrow q) \wedge (p \rightarrow r)$ and $p \rightarrow (q \wedge r)$ are logically equivalent by developing a series of logical equivalences and by constructing the truth table.