

Leonel Garay

CS-225: Discrete Structures in CS

Homework 1, Part 1

Exercise Set 2.1: Problem #5 (b, c, d)

- b. Not a statement
- c. Statement
- d. Not a statement

Exercise Set 2.1: Problem #10

- a. $p \wedge q \wedge r$
- b. $p \wedge \sim q$
- c. $p \wedge (\sim q \vee \sim r)$
- d. $(\sim p \wedge q) \wedge \sim r$
- e. $\sim p \vee (q \wedge r)$

Exercise Set 2.1: Problem (26, 28, 29, 30, 39)

- 26. Sam is not an orange belt or Kate is not a red belt
- 28. The train is not late and my watch is not fast.
- 29. The computer program does not have a logical error in the first ten lines and it is not being run with an incomplete data set.
- 30. The dollar is not at an all-time high or the stock market is not at a record low.
- 39. $(\text{num_orders} > 50 \text{ or } \text{num_instock} < 300) \text{ and } (50 \geq \text{num_order} > 75 \text{ or } \text{num_instock} < 500)$

Exercise Set 2.1: Problem #42

p	q	$\sim p$	$\sim q$	$(\sim p \vee q)$	$(p \wedge \sim q)$	$(\sim p \vee q) \vee (p \wedge \sim q)$
T	T	F	F	T	F	T
F	T	T	F	T	F	T
T	F	F	T	F	T	T
F	F	T	T	T	F	T

Answer: *Tautology, because all are T.*

Exercise Set 2.1: Problem #54

- $(p \wedge (\sim(\sim p) \wedge \sim q)) \vee (p \wedge q)$ by De Morgan's Laws
- $(p \wedge (p \wedge \sim q)) \vee (p \wedge q)$ by Double Negative Laws
- $(\sim q \wedge (p \wedge p)) \vee (p \wedge q)$ by Associative Laws
- $(\sim q \wedge p) \vee (p \wedge q)$ by Idempotent laws
- $(p \wedge \sim q) \vee (p \wedge q)$ by Commutative Laws
- $p \wedge (\sim q \vee q)$ by Distributive Laws
- $p \wedge (q \vee \sim q)$ by Commutative Laws
- $p \wedge t$ by Negation Laws
- p by Identity Laws