

CISC-102 WINTER 2016

HOMEWORK 10

Please work on these problems and be prepared to share your solutions with classmates in class next Friday. Assignments will **not** be collected for grading.

READINGS

Read chapter 4 of *Schaum's Outline of Discrete Mathematics*.

PROBLEMS

- (1) Use a truth table to verify that the proposition $p \vee \neg(p \wedge q)$ is a tautology, that is, the expression is true for all values of p and q .
- (2) Use a truth table to verify that the proposition $(p \wedge q) \wedge \neg(p \vee q)$ is a contradiction, that is, the expression is false for all values of p and q .
- (3) Use a truth table to show that $p \vee q \equiv \neg(\neg p \wedge \neg q)$
- (4) Show that the following argument is valid.

$$p \rightarrow q, \neg q \vdash \neg p$$

- (5) Let $A = \{1, 2, 3, 4, 5\}$. Determine the truth value of each of the following statements.
 - (a) $(\exists x \in A)(x + 2 = 7)$
 - (b) $(\forall x \in A)(x + 2 < 8)$
 - (c) $(\exists x \in A)(x + 3 < 2)$
 - (d) $(\forall x \in A)(x + 3 \leq 9)$
- (6) Let $A = \{1, 2, 3, 4, 5\}$. And let $(x, y) \in A^2$, be the domain of the propositions given below. Determine the truth value of the following statements.
 - (a) $\exists x \forall y, x^2 < y + 1$
 - (b) $\forall x \exists y, x^2 < y + 1$