

## Truth table to compound proposition

Given a truth table, how do we find an expression using the input variables and logical operators that has the output values specified in this table?

*Application:* design a circuit given a desired input-output relationship.

Input		Output	
$p$	$q$	$mystery_1$	$mystery_2$
$T$	$T$	$T$	$F$
$T$	$F$	$T$	$F$
$F$	$T$	$F$	$F$
$F$	$F$	$T$	$T$

Expressions that have output  $mystery_1$  are

Expressions that have output  $mystery_2$  are

*Idea:* To develop an algorithm for translating truth tables to expressions, define a convenient **normal form** for expressions.

## Dnf cnf definition

**Definition** An expression built of variables and logical operators is in **disjunctive normal form** (DNF) means that it is an OR of ANDs of variables and their negations.

**Definition** An expression built of variables and logical operators is in **conjunctive normal form** (CNF) means that it is an AND of ORs of variables and their negations.