

### 3.27.1. Disjunctive Normal Form Problems

A. For each of the following truth tables, provide a sentence in **Disjunctive Normal Form** which takes that truth table.

Truth Table 1

<u>1</u>
<u>1</u>
<u>0</u>
<u>0</u>
<u>0</u>
<u>1</u>
<u>0</u>
0

Truth Table 2

<u>0</u>
<u>0</u>
<u>1</u>
<u>0</u>
<u>0</u>
<u>1</u>
<u>0</u>
0

Truth Table 3

<u>0</u>
<u>0</u>
<u>0</u>
<u>0</u>
<u>0</u>
<u>1</u>
<u>0</u>
1

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B. In the text it was noted that DNF imposes a strict hierarchy of **scope** on the connectives: a tilde always has smaller scope than a wedge or vel, and a wedge always has smaller scope than a vel.

Because of this scope hierarchy, we could leave out all parentheses in DNF without any sentence being ambiguous.

Assume that each of the following sentences is in DNF, and **add all missing parentheses** in order to yield a proper sentence of the Chapter Three language.

1.  $\sim P \vee Q \wedge R$
2.  $P \wedge \sim P \vee P$
3.  $P \vee \sim P \wedge P$

C. Build truth tables for Sentences 2 and 3 (from Set B, above), to decide for each whether it is a **logical truth**, a **contradiction**, or neither.