Discrete Mathematics and Proof Unit 1 practice: Building a truth table for a compound statement

Name _____ Date _____ Period _____

1. Give the last column of each statement's truth table, rows in the fixed order. Show a column for each piece.

(a) $\neg(P \wedge \neg Q)$

(b) $\neg P \wedge \neg Q$

(c) $\neg Q \vee \neg P$

(d) $\neg(P \vee Q)$

(e) $\neg(Q \wedge P)$

(f) $(P \vee Q) \wedge Q$

2. Each statement needs two or more columns before its last. Build them, inside out, and give the last column.

(a) $\neg(\neg P \vee Q)$

(b) $(\neg P \vee \neg Q) \wedge P$

(c) $(\neg P \wedge Q) \vee P$

(d) $(P \vee \neg Q) \wedge \neg P$

(e) $(P \vee Q) \wedge \neg(P \wedge \neg Q)$

(f) $\neg(P \vee Q) \vee (P \wedge Q)$

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3. Build each truth table on the three letters P, Q, R (eight rows, fixed order) and give its last column. A piece used twice gets one column.

(a) $(P \vee Q) \wedge \neg R$

(b) $(Q \wedge R) \vee (P \wedge \neg(Q \wedge R))$

(c) $P \wedge \neg(P \wedge R)$

(d) $(\neg P \vee R) \wedge (Q \vee \neg R)$

4. Write each rule in symbols, then build its truth table.

(a) Kayaks may go out on the lake when the water is calm and either a guide is on duty or the paddler is not a beginner. Let C be "the water is calm", G be "a guide is on duty" and B be "the paddler is a beginner". Use the letters in the order C, G, B and list the rows in which a kayak may go out.

(b) A greenhouse fan runs when it is hot inside and the roof vent is closed, or when it is humid inside and the roof vent is open. Let H be "it is hot inside", U be "it is humid inside" and V be "the roof vent is open". Use the letters in the order H, U, V and list the rows in which the fan runs.

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