2.33.1. Logical Duality Problems

A. State the **True/False Swap** of Mystery Truth Tables 1 and 2. (*Remember that the T/F Swap applies the sentence letters "P" and "Q" as well.*)

P	**Q**	❶	❷
1	1	**0**	**1**
1	0	**1**	**0**
0	1	**1**	**1**
0	0	**1**	**1**

B. For each of the logical principles below, state its **dual principle**.

1. For any two sentences: either the **negation** of one of them is **false**, or their **disjunction** is **false**.

2. In a truth tree, a **true negation** doesn't branch.

3. In a truth tree, a **true conjunction** doesn't branch.

4. In a truth tree, a **true disjunction** branches.

5. A **disjunction** with a **contradiction** as one part is equivalent to the other part.

C. **Translate** each of the following English sentences into the formal language, and state the **connective dual** of that formal sentence; then **state** that **dual** sentence **in English**.

1. Neko didn't fail to order sushi.

2. Jack went skydiving without going skydiving.

3. Letita's not a goth, and she's also not a goth.

4. Jack is a cat who either eats flies or doesn't.

5. Either we're having both truffles and grog, or we're having neither.

6. Jake didn't pass the exam, but either Letitia or Lucretia did.

7. Either Suki is neither tall nor tall and skinny, or she's neither tall nor skinny.

8. Either we're having truffles and grog, or truffles and grappa, or grog and grappa.[1]

D. Which of the sentences from **(B)** are **logically** (**semantically**) **equivalent** to their own connective dual?

E. For each of the following pairs of sentences, decide whether they are (i) **connective duals**, and whether they are (ii) **semantic duals**.

1a.
1b.

[1] Adapted from Couturat 1905 §14