1. A multiset is a set where we individuate each copy of an object. So, for example, \( \{1,2,1\} \) is not the same multiset as \( \{1,2\} \). For multisets \( X \) and \( Y \), let the semicolon denote multiset union. Which is the structural rules SR6, SR7, SR8 does it obey?

2. Show that \( P \rightarrow Q \vdash \neg Q \rightarrow \neg P \) in DW.

3. Show in two ways that the sentence \( (P \rightarrow Q) \lor (Q \rightarrow P) \) is valid in the language RM. First, show it by natural deduction. Second, show it directly by arguing about truth values in Sugihara’s matrix.

4. Show that the sentence \( P \rightarrow (Q \rightarrow P) \) is not valid for RM.

5. Use natural deduction to derive \( P \rightarrow (P \rightarrow P) \) in RM.

6. Use natural deduction to derive \( \vdash (P \rightarrow \neg P) \rightarrow \neg P \) in CPL. But write out the full details, and show where you use the structural rules!