Exercise 3.32. *[1WF](Proposed on 2022-12)* *Consider the sets:*

- *P all the professors,*

- *S all scientists,*

- *F the set of philosophers,*

- *M the set of mathematicians.*

For each of the following sentences, write a formula that represents it, using the above sets, the empty set, relations $\subseteq, =, \neq$, and set operations $\cup, \cap, \setminus$.

- *not all professors are scientists*

- *some mathematician is philosopher;*

- *if a philosopher is not a mathematician then s/he is a professor;*

- *all philosophers are scientists or professors, but not mathematicians;*

- *if there is a mathematician who is also a scientist, then s/he is neither a philosopher nor a professor.*

Solution 1. *[1WG]*