Practice Problems

Symbolize the forms of the following statements, using the sentential letters indicated:

1. If Meacham is impeached (I) or convicted (C), then unless he resigns before he is removed from office (R), he will be unable to run in the recall election (U).
   $\{(I \lor C) \rightarrow (\neg R \rightarrow U)\}$

2. If Robertson wins Florida (F) and Jackson wins Tennessee (T), then if Hart loses in Georgia (G), Gephart will win in Indiana (I) if he is still in the race (R).
   $\{(F \land T) \rightarrow [G \rightarrow (R \rightarrow I)]\}$

3. If Victoria and the Kaiser were cousins (C), then Germany and England were friendly (F), in which case World War II never happened (W).
   $[(C \rightarrow F) \land (F \rightarrow \neg W)]$

4. If you take the test (T) and fail (F) you will be in trouble with the university (U), but if you take the test and pass you will be in trouble with the other students (S), and if you don’t take the test you will be in trouble with the Dean (D).
   $\{(T \land F) \rightarrow U \land [(T \land \neg F) \rightarrow S] \land \neg T \rightarrow D\}$

5. If Henry is in pursuit of Oriental mysteries (P), then if he finds the dragon lady (L) and the Foo Dog (D), he will be unable to emulate Charlie Chan (C) unless either the Dragon Lady is benevolent (B) or the Foo Dog is broken (K).
   $(P \rightarrow [(L \land D) \rightarrow \neg (B \lor K) \rightarrow \neg C])$

6. If the mining venture proves successful (S) but Jacob backs out too early (E), then Jacob’s bank account will suffer (U) and his greedy parents will disown him (D) unless he turns to a life of crime (C).
   $\{(S \land E) \rightarrow U \land (\neg C \rightarrow D)\}$

7. If the job is finished on time (F), we will be able to eat lunch on the lawn (L), but if it isn’t finished on time we will have to eat lunch in the cellar (C), and in that case we will have to share our lunch with the mice (M).
   $\{[(F \rightarrow L) \land (\neg F \rightarrow C)] \land (C \rightarrow M)\}$
8. Neither England nor France will be competitive in downhill skiing (E,F) unless Switzerland beats Austria (B), but Switzerland won’t beat Austria unless Schwartz breaks his leg (S).

\[\neg B \rightarrow (\neg E \land \neg F) \land (\neg S \rightarrow \neg B)\]

9. If the plant will die (D) unless it gets water (W), but it won’t get water if the sun shines (S) (unless there is a miracle (M)), then the plant will die.

\[(\neg W \rightarrow D) \land (\neg M \rightarrow (S \rightarrow \neg W)) \rightarrow D\]

10. If Marilyn Monroe married Guy Lombardo (M) and they had a son named “Ronnie” (R), he too could be president (P) if he moved to Old Tucson (T) and became a cowboy movie star (C).

\[(M \land R) \rightarrow [(T \land C) \rightarrow P]\]