Propositional Translation Practice

Use the abbreviations given to translate the following English sentences into symbolic logic.

R = John will get a raise.
W = John works hard.
I = John insults his boss.
P = John is promoted.
C = John is complemented on his work.

1) John will get a raise if he works hard and doesn't insult his boss.

2) John will insult his boss only if he is neither promoted nor complimented on his work.

3) John will not get both a raise and a promotion unless he works hard.

4) If John works hard then he with either get promoted or get a raise but not both, provided he does not insult his boss.

Symbolize the following, using the abbreviations that have been provided.

D= I diet; E= I exercise; G = I gain weight; M = I am motivated; T = I get too tired; P = I am depressed; L = I am lazy; S= I swim; R = I run; W = I drive to work.

5. I will not both diet and exercise unless I am motivated.

6. I will diet only if I am motivated, and I will exercise only if I don't get too tired.

7. I won't gain weight if I either swim or run, unless I drive to work and don't diet.

8. I will be depressed only if I am lazy and neither diet nor exercise.

9. Only if I'm motivated and don't get too tired do I diet and exercise.

10. I exercise whenever I'm motivated and not too tired.

11. I swim or run only if I exercise.

12. If I don't swim then I'll either gain weight provided I don't diet or be depressed provided I'm not motivated.

Symbolize the following, using the abbreviations given.

R = Interest rates will rise; E = The economy improves; C = Consumers increase borrowing; S = Consumer spending falls; U = Unemployment rises; D = The deficit will be reduced; T = Taxes are raised; G = Government spending increases; F = Stock prices will fall; J = More jobs are created; H = There is a boom in housing; A = There is a boom in the automobile industry.

13. Interest rates will rise only if the economy improves and consumers increase borrowing.

14. The economy will not improve and interest rates will not rise if either consumer spending falls or unemployment rises.

15. Either interest rates or unemployment will rise, but not both.

16. Interest rates will not rise if the economy improves, provided consumers do not increase borrowing.

17. The deficit will be reduced and the economy will improve if taxes are raised and interest rates do not rise.

18. The deficit will be reduced only if taxes are raised and government spending does not increase, unless interest rates rise.

19. Unless the deficit is reduced, taxes and interest rates will rise and the economy will not improve.

20. Stock prices will fall and the economy will fail to improve if interest rates rise and the deficit is not reduced, unless either more jobs are created or there is a boom in housing.

21. Neither taxes nor interest rates will rise if the deficit is reduced, but if the deficit is not reduced then both taxes and interest rates will rise.

22. Neither stock prices nor consumer spending will fall, provided unemployment does not rise and there is a boom in either housing or the automobile industry.

23. The economy will improve if the deficit is reduced, but the deficit will be reduced only if government spending does not increase and taxes are raised.

24. Stock prices will fall and either interest rates or unemployment will rise, unless either the deficit is reduced and the economy improves or taxes are not raised and consumer spending falls.

25. Only if there is a boom in housing and the automobile industry will more jobs be created and the deficit be reduced, but more jobs will not be created unless government spending increases.

<u>Answers</u>

1. (W & ~I) -> R
2. I -> ~(P v C) or I -> (~P & ~C)
3. ~(R & P) v W or ~W -> ~(R & P) or (~R v ~P) v W or ~W -> (~R v ~P)
4. ~I -> {W -> [(P v R) & ~(P & R)]}
5. ~(D & E) v M or ~M -> ~(D & E) or (~D v ~E) v M or ~M -> (~D v ~E)
6. (D -> M) & (E -> ~T)
7. [(S v R) -> ~G] v (W & ~D) or ~(W & ~D) -> ((S v R) -> ~G)
8. P -> (L & ~(D v E)) or P -> (L & (~D & ~E))
9. (D & E) -> (M & ~T)
10. (M & ~T) -> E
11. ((S v R) -> E)
12. ~S > [(~D -> G) v (~M -> P)]
13. R -> (E & C)
14. (S v U) -> (~E & ~R)
15. (R v U) & ~(R & U)
16. ~C -> (E -> ~R)
17. (T & ~R) -> (D & E)
18. [D -> (T & ~G)] v R or ~R -> (D -> (T &~G))
19. [(T & R) & ~E] v D or ~D -> ((T & R) & ~E)
20. [(R & ~D) -> (F & ~E)] v (J v H) or ~(J v H) -> ((R & ~D) -> (F & ~E))
21. (D -> ~(T v R)) & (~D -> (T & R)) or (D -> (~T & ~R)) & (~D -> (T & R))
22. (~U & (H v A)) -> ~(F v S) or (~U & (H v A)) -> (~F & ~S)
23. (D -> E) & (D ->(~G & T))
24. (F & (R v U)) v [(D & E) v (~T & S)] or ~((D & E) v (~T & S)) -> (F & (R v U))
25. [(J & D) -> (H & A)] & (~J v G) or [(J & D) –> (H & A)] & (~G -> ~J)