

$$\begin{array}{l} \star 19. \sim L \supset M \\ \quad T \quad F \end{array}$$

$$\begin{array}{l} 20. E \supset \sim M \\ \quad T \quad F \end{array}$$

$$\begin{array}{l} 21. \sim N \equiv R \\ \quad F \quad F \end{array}$$

$$\begin{array}{l} \star 22. \sim (H \vee B) \\ \quad T \end{array}$$

$$\begin{array}{l} 23. Q \supset (R \bullet S) \\ \quad T \quad F \end{array}$$

$$\begin{array}{l} 24. K \supset \sim (S \equiv M) \\ \quad T \quad F \quad F \end{array}$$

$$\begin{array}{l} \star 25. A \vee \sim (C \bullet \sim R) \\ \quad F \quad T \end{array}$$

II. Use indirect truth tables to determine whether the following arguments are valid or invalid.

$$\begin{array}{l} \star 1. B \supset C \\ \quad \sim C \\ \hline \quad \sim B \end{array}$$

$$\begin{array}{l} 2. \sim E \vee F \\ \quad \sim E \\ \hline \quad \sim F \end{array}$$

$$\begin{array}{l} 3. P \supset (Q \bullet R) \\ \quad R \supset S \\ \hline \quad P \supset S \end{array}$$

$$\begin{array}{l} \star 4. \frac{\sim (I \equiv J)}{\sim (I \supset J)} \end{array}$$

$$\begin{array}{l} 5. W \supset (X \supset Y) \\ \quad X \supset (Y \supset Z) \\ \hline \quad W \supset (X \supset Z) \end{array}$$

$$\begin{array}{l} 6. A \supset (B \vee C) \\ \quad C \supset (D \bullet E) \\ \quad \sim B \\ \hline \quad A \supset \sim E \end{array}$$

$$\begin{array}{l} \star 7. G \supset H \\ \quad H \supset I \\ \quad \sim J \supset G \\ \quad \sim I \\ \hline \quad J \end{array}$$

$$\begin{array}{l} 8. J \supset (\sim L \supset \sim K) \\ \quad K \supset (\sim L \supset M) \\ \quad (L \vee M) \supset N \\ \hline \quad J \supset N \end{array}$$

$$\begin{array}{l} 9. P \bullet (Q \vee R) \\ \quad (P \bullet R) \supset \sim (S \vee T) \\ \quad (\sim S \vee \sim T) \supset \sim (P \bullet Q) \\ \hline \quad S \equiv T \end{array}$$

$$\begin{array}{l} \star 10. (M \vee N) \supset O \\ \quad O \supset (N \vee P) \\ \quad M \supset (\sim Q \supset N) \\ \quad (Q \supset M) \supset \sim P \\ \hline \quad N \equiv O \end{array}$$

$$\begin{array}{l} 11. (A \vee B) \supset (C \bullet D) \\ \quad (\sim A \vee \sim B) \supset E \\ \quad (\sim C \vee \sim D) \supset E \end{array}$$

$$\begin{array}{l} 12. F \supset G \\ \quad \sim H \vee I \\ \quad (G \vee I) \supset J \\ \quad \sim J \\ \hline \quad \sim (F \vee H) \end{array}$$

$$\begin{array}{l} \star 13. (A \vee B) \supset (C \bullet D) \\ \quad (X \vee \sim Y) \supset (\sim C \bullet \sim W) \\ \quad (X \vee Z) \supset (A \bullet E) \\ \hline \quad \sim X \end{array}$$

$$\begin{array}{l} 14. \sim G \supset (\sim H \bullet \sim I) \\ \quad J \supset H \\ \quad K \supset (L \bullet M) \\ \quad K \vee J \\ \hline \quad L \bullet G \end{array}$$

$$\begin{array}{l} 15. N \vee \sim O \\ \quad P \vee O \\ \quad P \supset Q \\ \quad (N \vee Q) \supset (R \bullet S) \\ \quad S \supset (R \supset T) \\ \quad O \supset (T \supset U) \\ \hline \quad U \end{array}$$