

# Logical Proof HW KEY

$$(P1) \quad \left. \begin{array}{l} ① \sim(C \wedge B) \rightarrow ② \sim C \vee \sim B \\ ③ C \end{array} \right\} \rightarrow ④ \sim B \quad \left. \begin{array}{l} ⑤ A \rightarrow B \end{array} \right\} \rightarrow ⑥ \sim A$$

- ① Given
- ② DeMorgan's Law
- ③ Given
- ④ L. of Disjunctive Inf.
- ⑤ Given
- ⑥ L. of Contrapositive Inf.

$$(P2) \quad \left. \begin{array}{l} ① \sim(\sim R \wedge Q) \rightarrow ② R \vee \sim Q \\ ③ Q \end{array} \right\} \rightarrow ④ R \quad \left. \begin{array}{l} ⑤ R \rightarrow B \\ ⑦ B \rightarrow P \end{array} \right\} \rightarrow ⑥ B \quad \left. \begin{array}{l} ⑧ P \end{array} \right\}$$

- ① Given
- ② DeMorgan's Law
- ③ Given
- ④ L. of Disjunctive Inf.
- ⑤ Given
- ⑥ L. of Detachment
- ⑦ Given
- ⑧ Law of Detach.

$$(P3) \quad \left. \begin{array}{l} ① \sim A \wedge C \rightarrow ② \sim A \\ ③ A \vee W \end{array} \right\} \rightarrow ④ W \quad \left. \begin{array}{l} ⑤ R \rightarrow \sim W \end{array} \right\} \rightarrow ⑥ \sim R$$

- ① Given
- ② L. of Simplification
- ③ Given
- ④ L. of Disjunctive Inference
- ⑤ Given
- ⑥ L. of Contrapositive Inf.

$$(P4) \quad \left. \begin{array}{l} ① \sim B \wedge \sim C \rightarrow ② \sim B \\ ③ A \vee B \end{array} \right\} \rightarrow ④ A \quad \left. \begin{array}{l} ⑤ A \rightarrow D \end{array} \right\} \rightarrow ⑥ D \quad \left. \begin{array}{l} ⑦ D \rightarrow E \end{array} \right\} \rightarrow ⑧ E$$

- ① Given
- ② L. of Simplification
- ③ Given
- ④ L. of Disjunctive Inference
- ⑤ Given
- ⑥ L. of Detachment
- ⑦ Given
- ⑧ L. of Detachment

$$(P5) \quad ① \sim(P \vee Q) \rightarrow ② \sim P \wedge \sim Q \rightarrow ③ \sim Q \quad \left. \begin{array}{l} ④ \sim Q \rightarrow R \end{array} \right\} \rightarrow ⑤ R$$

- ① Given
- ② DeMorgan's Law
- ③ L. of Simplification
- ④ Given
- ⑤ L. of Detachment

P6  $\left. \begin{array}{l} ① \sim(R \wedge \sim Q) \rightarrow ② \sim R \vee Q \\ ③ R \end{array} \right\} \rightarrow ④ Q$   
 $\left. \begin{array}{l} ④ Q \\ ⑤ Q \rightarrow T \end{array} \right\} \rightarrow ⑥ T$

- ① Given
- ② DeMorgan's law
- ③ Given
- ④ L. of Disjunctive Inf.
- ⑤ Given
- ⑥ L. of Detachment

$\left. \begin{array}{l} ⑥ \sim x \\ ⑦ x \rightarrow P \end{array} \right\} \rightarrow ⑧ \sim x$   
 $\left. \begin{array}{l} ⑧ \sim x \\ ⑨ \sim x \rightarrow P \end{array} \right\} \rightarrow ⑩ P$

- ⑤ Given
- ⑥ L. of Disjunct. Inf.
- ⑦ Given
- ⑧ L. of Contrapositive Inference
- ⑨ Given
- ⑩ Detachment

P7  $\left. \begin{array}{l} ① \sim CAD \rightarrow ② \sim C \\ ③ A \rightarrow C \end{array} \right\} \rightarrow ④ \sim A$   
 $\left. \begin{array}{l} ④ \sim A \\ ⑤ \sim A \rightarrow B \end{array} \right\} \rightarrow ⑥ B$

- ① Given
- ② L. of simplification
- ③ Given
- ④ L. of Contrapositive Inf.
- ⑤ Given
- ⑥ L. of Detachment

$\left. \begin{array}{l} ⑥ \sim M \\ ⑦ M \end{array} \right\} \rightarrow ⑧ \sim(M \wedge N) \rightarrow ⑨ \sim M \vee \sim N$   
 $\left. \begin{array}{l} ⑨ \sim M \vee \sim N \\ ⑩ M \end{array} \right\} \rightarrow ⑪ \sim N$

- ⑤ Given
- ⑥ L. of Disjunct. Inf.
- ⑦ Given
- ⑧ L. of Contrapositive Inference
- ⑨ Given
- ⑩ Detachment

P8  $\left. \begin{array}{l} ① A \wedge \sim B \rightarrow ② \sim B \\ ③ B \vee C \end{array} \right\} \rightarrow ④ C$   
 $\left. \begin{array}{l} ④ C \\ ⑤ C \rightarrow D \end{array} \right\} \rightarrow ⑥ D$

- ① Given
- ② L. of simplification
- ③ Given
- ④ L. of Disjunctive Inf.
- ⑤ Given
- ⑥ L. of Detachment

$\left. \begin{array}{l} ⑩ \sim(M \wedge N) \rightarrow ⑪ \sim(M \wedge N) \\ ⑫ \sim(M \wedge N) \end{array} \right\} \rightarrow ⑬ \sim(M \wedge N)$   
 $\left. \begin{array}{l} ⑬ \sim(M \wedge N) \\ ⑭ \sim Q \end{array} \right\} \rightarrow ⑮ \sim(Q \wedge M)$

- ⑤ Given
- ⑥ L. of Disjunct. Inf.
- ⑦ Given
- ⑧ L. of Contrapositive Inf.
- ⑨ DeMorgan's law
- ⑩ Given
- ⑪ Given
- ⑫ L. of Contrapositive Inf.
- ⑬ DeMorgan's law
- ⑭ Given
- ⑮ Detachment

P9  $\left. \begin{array}{l} ① \sim(A \wedge \sim B) \rightarrow ② \sim A \vee B \\ ③ A \end{array} \right\} \rightarrow ④ B$   
 $\left. \begin{array}{l} ④ B \\ ⑤ B \rightarrow C \end{array} \right\} \rightarrow ⑥ C$   
 $\left. \begin{array}{l} ⑥ C \\ ⑦ C \rightarrow D \end{array} \right\} \rightarrow ⑧ D$

- ① Given
- ② DeMorgan's law
- ③ Given
- ④ L. of Disjunctive Inf.
- ⑤ Given
- ⑥ L. of Detachment
- ⑦ Given
- ⑧ L. of Detachment

P12  $\left. \begin{array}{l} ① (M \wedge N) \rightarrow Q \\ ② \sim Q \end{array} \right\} \rightarrow ③ \sim(M \wedge N)$   
 $\left. \begin{array}{l} ③ \sim(M \wedge N) \\ ④ \sim M \vee \sim N \end{array} \right\} \rightarrow ⑤ \sim M$

- ① Given
- ② Given
- ③ L. of Contrapositive Inf.
- ④ DeMorgan's law
- ⑤ Given

P10  $\left. \begin{array}{l} ① \sim(\sim A \wedge \sim X) \rightarrow ② A \vee X \\ ③ \sim A \end{array} \right\} \rightarrow ④ X$   
 $\left. \begin{array}{l} ④ X \\ ⑤ X \rightarrow M \end{array} \right\} \rightarrow ⑥ M$   
 $\left. \begin{array}{l} ⑥ M \\ ⑦ M \rightarrow \sim B \end{array} \right\} \rightarrow ⑧ \sim B$   
 $\left. \begin{array}{l} ⑧ \sim B \\ ⑨ \sim R \rightarrow B \end{array} \right\} \rightarrow ⑩ R$

- ① Given
- ② DeMorgan's law
- ③ Given
- ④ L. of Disjunctive Inf.
- ⑤ Given
- ⑥ L. of Detachment
- ⑦ Given
- ⑧ L. of Detachment
- ⑨ Given
- ⑩ L. of Contrapositive Inf.

P11  $\left. \begin{array}{l} ① A \rightarrow C \\ ② A \end{array} \right\} \rightarrow ③ C$   
 $\left. \begin{array}{l} ③ C \\ ④ B \rightarrow \sim C \end{array} \right\} \rightarrow ⑤ \sim B$   
 $\left. \begin{array}{l} ⑤ \sim B \\ ⑥ \sim(D \wedge \sim B) \rightarrow ⑦ \sim D \vee B \end{array} \right\} \rightarrow ⑧ \sim D$

- ① Given
- ② Given
- ③ L. of Detachment
- ④ Given
- ⑤ L. of Contrapositive Inf.
- ⑥ Given
- ⑦ DeMorgan's law
- ⑧ L. of Disjunctive Inf.