

PLEASE WRITE LEGIBLY.

I. Use direct or indirect proof

1.  $A \vee \sim(B \vee \sim C)$
2.  $(C \rightarrow B) \cdot (A \rightarrow R)$
3.  $R \rightarrow W / K \rightarrow R$
4.  $C \rightarrow B$  2, Simp
5.  $\sim C \vee B$  4, Impl
6.  $B \vee \sim C$  5, Com
7.  $A$  1, 6, DS
8.  $A \rightarrow R$  2, Simp
9.  $R$  8, 7, MP
10.  $R \vee \sim K$  9, Add
11.  $\sim K \vee R$  10, Com
12.  $K \rightarrow R$  11, Impl

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>4. <math>\sim(K \rightarrow R)</math> AP</li> <li>5. <math>\sim(\sim K \vee R)</math> 4, Impl</li> <li>6. <math>K \cdot \sim R</math> 5, DeM</li> <li>7. <math>A \rightarrow R</math> 2, Simp</li> <li>8. <math>\sim R</math> 6, Simp</li> <li>9. <math>\sim A</math> 7, 8, MT</li> <li>10. <math>C \rightarrow B</math> 2, Simp</li> <li>11. <math>\sim C \vee B</math> 10, Impl</li> </ol> | <ol style="list-style-type: none"> <li>12. <math>B \vee \sim C</math> 11, Com</li> <li>13. <math>A</math> 1, 12, DS</li> <li>14. <math>A \cdot \sim A</math> 13, 9, Conj</li> <li>15. <math>K \rightarrow R</math> 4-14 IP</li> </ol> |
|---|---|

II. Use direct or indirect proof

1.  $E \leftrightarrow R$
2.  $M \rightarrow P$
3.  $\sim E \cdot \sim P / \sim(M \vee P) \cdot \sim R$
4.  $(E \rightarrow R) \cdot (R \rightarrow E)$  1, Equiv
5.  $R \rightarrow E$  4, Simp
6.  $\sim E$  3, Simp
7.  $\sim R$  5, 6, MT
8.  $\sim P$  3, Simp
9.  $\sim M$  2, 8, MT
10.  $\sim M \cdot \sim P$  9, 8, Conj
11.  $\sim(M \vee P)$  10, DeM
12.  $\sim(M \vee P) \cdot \sim R$  11, 7, Conj

III. For the argument below, do either a proof of invalidity or a truth tree to test the argument for the consistency/inconsistency of its premises. State clearly in the second case whether the premises are consistent or inconsistent. If you choose the proof of invalidity, provide an "answer" line showing the truth values of all the atomic sentences.

|   |   |   |   |   |
|---|---|---|---|---|
| A | B | M | C | R |
| F | T | F | T | T |

