

Name: _____

Rules of Replacement Worksheet

Prove each statement below using the Rules of Replacement and the Rules of Inference.

A.

1. $\sim Q$
2. $R \supset Q$
3. $\sim S \supset M$
4. $R \vee (S \supset Q) \quad / M \vee K$
5. $\sim R$ 2,1,MT
6. $S \supset Q$ 4,5,DS
7. $\sim Q \supset \sim S$ 6,Trans
8. $\sim S$ 7,1,MT
9. M 8,3,MP
10. $M \vee K$ 9, add

B.

1. $(P \vee Q) \supset S$
2. $P \vee (Q \vee R)$
3. $\sim R$
4. $\sim T \supset R \quad / S \equiv T$
5. $(P \vee Q) \vee R$ 2, assoc
6. $P \vee Q$ 5,3,DS
7. S 1,6,MP
8. $\sim \sim T$ 4,3,MT
9. T 8,DN
10. $S \cdot T$ 7,9,Conj
11. $(S \cdot T) \vee (\sim S \cdot \sim T)$ 10, add
12. $S \equiv T$ 11, Equiv

C.

1. $P \supset (Q \vee R)$
2. $S \supset \sim(Q \vee R) \quad / \sim(P \cdot S)$
3. $\sim(Q \vee S) \supset \sim P$ 1,Trans
4. $S \supset \sim P$ 2,3,HS
5. $\sim S \vee \sim P$ 4, Impl
6. $\sim(P \cdot S)$ 5, DM

D.

1. $P \supset \sim R$
2. $P \cdot (S \vee R)$
3. $(N \cdot M) \cdot L \quad / N \cdot S$
4. $N \cdot (M \cdot L) \quad 3, \text{Assoc}$
5. $N \quad 4, \text{simp}$
6. $P \quad 2, \text{simp}$
7. $\sim R \quad 1, 6, \text{MP}$
8. $S \vee R \quad 2, \text{simp}$
9. $S \quad 8, 7, \text{DS}$
10. $N \cdot S \quad 5, 9, \text{conj}$

E.

1. $\sim R \vee \sim S$
2. $P \vee [Q \vee (R \cdot S)]$
3. $L \supset \sim P \quad / L \supset Q$
4. $\sim(R \cdot S) \quad 1, \text{DM}$
5. $(P \vee Q) \vee (R \cdot S) \quad 2, \text{assoc}$
6. $P \vee Q \quad 5, 4, \text{DS}$
7. $\sim P \supset Q \quad 6, \text{Impl}$
8. $L \supset Q \quad 3, 7, \text{HS}$

F.

1. $\sim Q$
2. $M \supset Q$
3. $\sim R \vee (S \supset M) \quad / \sim R \vee \sim S$
4. $R \supset (S \supset M) \quad 4, \text{Impl}$
5. $(R \cdot S) \supset M \quad 5, \text{Exp}$
6. $(R \cdot S) \supset Q \quad 5, 2, \text{HS}$
7. $\sim(R \cdot S) \quad 6, 1, \text{MT}$
8. $\sim R \vee \sim S \quad 7, \text{DM}$