Basic Proofs   Turn in problem 12 for grade. The rest are for practice.

1. $\{A \wedge B, B \to C\} \vdash A \wedge (B \wedge C)$

2. $\{(P \vee R) \wedge (S \vee R), \neg R \wedge Q\} \vdash P \wedge (Q \vee R)$

3. $\{(X \wedge Y) \to Z, X \wedge W, W \to Y\} \vdash Z$

4. $\{A \vee (B \vee G), A \vee (B \vee H), \neg A \wedge \neg B\} \vdash G \wedge H$

5. $\{P \wedge (Q \wedge \neg R), R \vee T\} \vdash T \vee S$

6. $\{((A \to D) \vee B) \vee C, \neg C, \neg B, A\} \vdash D$

7. $\{A \vee \neg\neg B, \neg B \vee \neg C, C \vee A, \neg A\} \vdash D$

8. $\{P \leftrightarrow (Q \leftrightarrow R), P, P \to R\} \vdash Q$

9. $\{A \to (B \to C), A, B\} \vdash C$

10. $\{(X \vee A) \to \neg Y, Y \vee (Z \wedge Q), X\} \vdash Z$

11. $\{A \wedge (B \wedge C), A \wedge D, B \wedge E\} \vdash D \wedge (E \wedge C)$

12. $\{A \wedge (B \vee \neg C), \neg B \wedge (C \vee E), E \to D\} \vdash D$

13. $\{A \to B, B \to C, C \to A, B, \neg A\} \vdash D$

14. $\{\neg A \wedge B, A \vee P, A \vee Q, B \to R\} \vdash P \wedge (Q \wedge R)$

Conditional Proofs   Turn in problem 3 and 4 for grade

1. $\{X \to (A \wedge B), B \to Y, B \to A\} \vdash X \to Y$

2. $\{\neg W \wedge \neg E, Q \to D\} \vdash (W \vee Q) \to (E \vee D)$

3. $\{B \to \neg E, A \to \neg D, D \vee (E \vee R), (R \wedge A) \to C\} \vdash A \to (B \to C)$

4. $\{(K \to K) \to R, (R \vee M) \to N \vdash N$

5. $\{(A \wedge B) \to D, D \to (X \wedge Y), C \to Z\} \vdash A \wedge (B \wedge C) \to X \wedge (Y \wedge Z)$

Reductio Ad Absurdum   Turn in problem 6 and 7 for grade

1. $A \to (B \vee (C \vee D)) \vdash \neg[A \wedge (\neg B \wedge (\neg C \wedge \neg D))]$

2. $P \to Q \vdash \neg Q \to \neg P$

3. $P \wedge Q \vdash \neg(P \to \neg Q)$

4. $(P \wedge Q) \to (R \vee S), \neg(R \vee S) \vdash \neg(P \wedge Q)$

5. $\neg(P \to Q) \vdash P \wedge \neg Q$

6. $S \leftrightarrow T, T \vee S \vdash \neg(T \to \neg S)$

7. $Q \to R \vdash \neg Q \vee R$