**Natural Deduction Exercises:** ***Conditional Proof and Indirect Proof***

Using the rules of inference, rules of replacement, conditional proof, or indirect proof provide a deduction of the conclusion of each argument from the premises. If the conclusion of the argument is a conditional statement, use conditional proof. If the conclusion is not a conditional, use indirect proof.

*Conditional Proof*

I.

1. ¬Q
2. (R → Q)
3. (¬R → Z) / (¬Q → Z)

II.

1. (P ∨ R)
2. (Q ∧ T)
3. (P ∧ T) → Z) / (¬R → Z)

III.

1. (P ∨ Q) → T)
2. (¬T ∨ S) / (P → S)

IV.

1. (¬R ∨ S)
2. (T ∧ Q)
3. (S ∧ T) → W / (R → W)

V.

1. (T ∨ (¬S ∨ R))
2. (S → T)
3. ((S → T) → W) / (¬R → W)

VI.

1. (P → (Q ∧ R)
2. ¬(Q ∧ R)
3. (¬P → W)
4. (Z ∨ ¬W) / Z

VII.

1. $(P \rightarrow Q) \rightarrow (\neg R \rightarrow \neg T)$
2. $\neg(\neg R \rightarrow \neg T)$
3. $((P \rightarrow Q) \vee Z)$ / $Z$

VIII.

1. $((P \vee Q) \wedge R)$
2. $(R \rightarrow Z)$
3. $(P \vee Q) \rightarrow V)$
4. $(T \rightarrow \neg(Z \wedge V))$ / $\neg T$

IX.

1. $(P \vee Q)$
2. $(Q \rightarrow R)$
3. $(\neg P \wedge S)$ / $(R \wedge S)$

X.

1. $((P \rightarrow R) \rightarrow T)$
2. $(T \rightarrow V)$
3. $(\neg V \wedge W)$
4. $(\neg(P \rightarrow R) \wedge W) \rightarrow Z$ / $Z$