

Series Two in Mathematical Logic

Second year Mathematic

2025/2026

Exercise 1:

Question: Evaluate the following formulas for the given truth values: $P = F, Q = T, R = F$.

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

Exercise 2:

Question: Calculate the length of the following propositional formulas:

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

Exercise 3:

Question: Determine the height of the following propositional formulas:

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

Exercise 4:

Question: Draw the tree structure for the following formulas:

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

Exercise 5:

Question: Draw the tree structure for the following nested formulas:

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

Exercise 6:

Question: Draw the tree structure for the following complex formulas:

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

Exercise 7:

Question: Draw the tree structure for the following multi-level formulas:

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