

Translating English Sentences into Propositional Logic

Q1

Sentence: "If it is raining and you don't have an umbrella, then you will get wet."

Propositional variables:

- p: It is raining.
- q: You have an umbrella.
- r: You will get wet.

Logical Expression: $(p \wedge \neg q) \rightarrow r$

Q2

Sentence: "You can drive a car if you have a license and you are not under 18."

Propositional variables:

- p: You can drive a car.
- q: You have a license.
- r: You are under 18.

Logical Expression: $(q \wedge \neg r) \rightarrow p$

Q3

Sentence: "If the shop is open, then you can buy milk; otherwise, you cannot buy milk."

Propositional variables:

- p: The shop is open.
- q: You can buy milk.

Logical Expression: $(p \rightarrow q) \wedge (\neg p \rightarrow \neg q), p \leftrightarrow q$

Q4

Sentence: "You will pass the exam if you study or if the exam is easy."

Propositional variables:

- p: You study.
- q: The exam is easy.
- r: You will pass the exam.

Logical Expression: $(p \vee q) \rightarrow r$

Q5

Sentence: "You can enter the concert only if you buy a ticket and show your ID."

Propositional variables:

- p: You can enter the concert.
- q: You buy a ticket.
- r: You show your ID.

Logical Expression: $p \rightarrow (q \wedge r)$

Q6

Sentence: "If the traffic light is red, then cars must stop; if it is green, then cars can go."

Propositional variables:

- p: The traffic light is red.
- q: The traffic light is green.
- r: Cars must stop.
- s: Cars can go.

Logical Expression: $(p \rightarrow r) \wedge (q \rightarrow s)$

Q7

Sentence: "You will win the game if and only if you practice hard."

Propositional variables:

- p: You will win the game.
- q: You practice hard.

Logical Expression: $p \leftrightarrow q$

Q8

Sentence: "If you are hungry and you don't have money, then you cannot buy food."

Propositional variables:

- p: You are hungry.
- q: You have money.
- r: You can buy food.

Logical Expression: $(p \wedge \neg q) \rightarrow \neg r$

Q9

Sentence: "If it is Sunday or it is a holiday, then the library is closed."

Propositional variables:

- p: It is Sunday.
- q: It is a holiday.
- r: The library is closed.

Logical Expression: $(p \vee q) \rightarrow r$

Q10

Sentence: "If you are not logged in, then you cannot post a comment."

Propositional variables:

- p: You are logged in.
- q: You can post a comment.

Logical Expression: $\neg p \rightarrow \neg q$