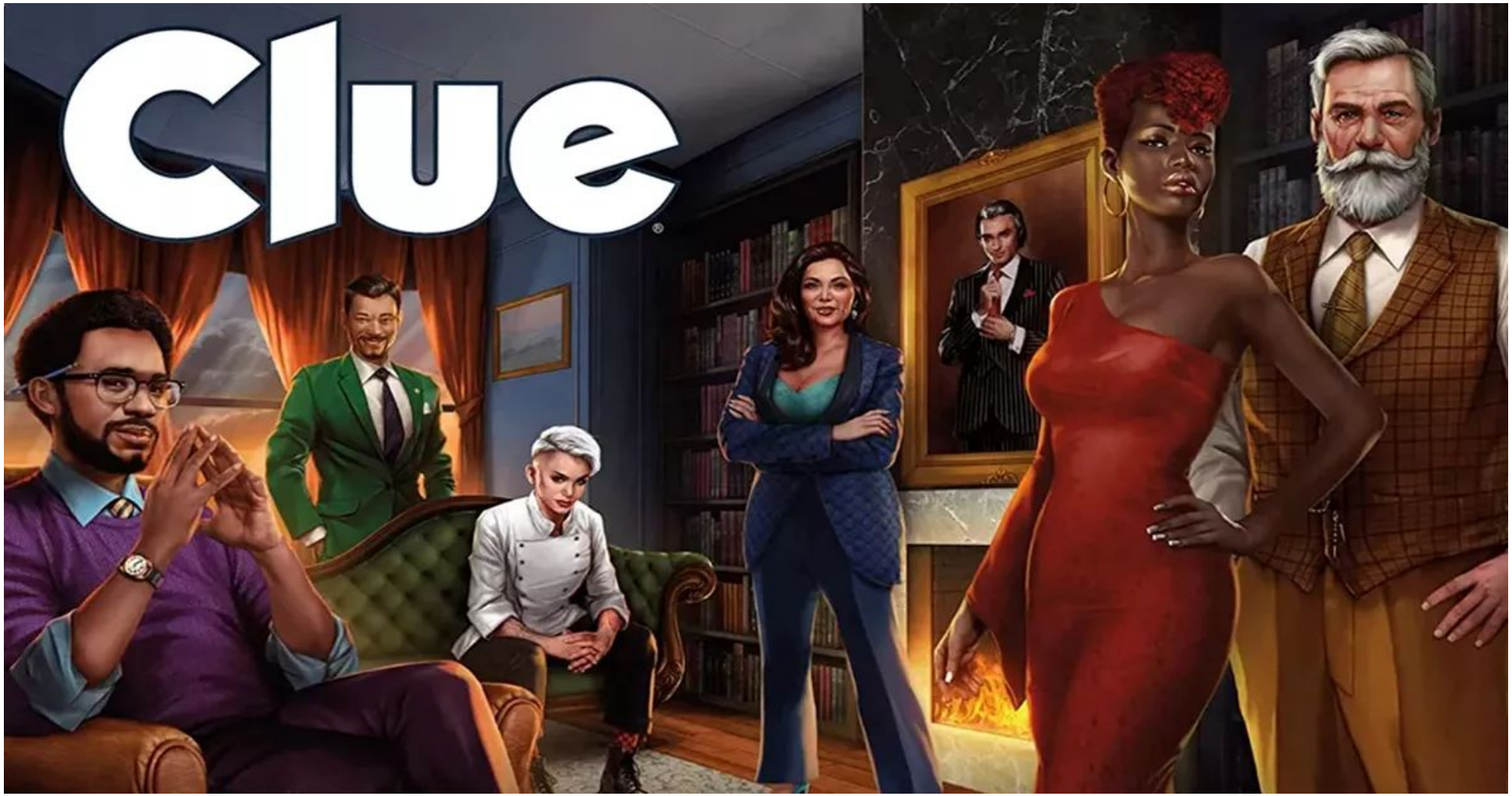
English to Logic

CS1800 Fall 2025


Clue

In Clue, there are...

- Suspects
- Weapons
- Rooms

P = Ms. Scarlet did it
Q = Col. Mustard did it
R = Prof. Plum did it

P = Ms. Scarlet did it

Q = Col. Mustard did it

R = Prof. Plum did it

A = The ballroom was used

B = The conservatory was used

P = Ms. Scarlet did it

Q = Col. Mustard did it

R = Prof. Plum did it

A = The ballroom was used

B = The conservatory was used

W = The candlestick was used

V = The lead pipe was used

P = Ms. Scarlet did it
Q = Col. Mustard did it
R = Prof. Plum did it

A = The ballroom was used
B = The conservatory was used

W = The candlestick was used
V = The lead pipe was used

Logic should respect the original statement

P = Ms. Scarlet did it
Q = Col. Mustard did it
R = Prof. Plum did it

A = The ballroom was used
B = The conservatory was used

W = The candlestick was used
V = The lead pipe was used

Logic should respect the original statement

Col. Mustard did it in the ballroom

P = Ms. Scarlet did it
Q = Col. Mustard did it
R = Prof. Plum did it

A = The ballroom was used
B = The conservatory was used

W = The candlestick was used
V = The lead pipe was used

Logic should respect the original statement

Col. Mustard did it in the ballroom

$$Q \wedge A$$

P = Ms. Scarlet did it
Q = Col. Mustard did it
R = Prof. Plum did it

A = The ballroom was used
B = The conservatory was used

W = The candlestick was used
V = The lead pipe was used

Logic should respect the original statement

Col. Mustard did it in the ballroom

Q	A	$Q \wedge A$
T	T	T
T	F	F
F	T	F
F	F	F

P = Ms. Scarlet did it
Q = Col. Mustard did it
R = Prof. Plum did it

A = The ballroom was used
B = The conservatory was used

W = The candlestick was used
V = The lead pipe was used

Logic should respect the original statement

Ms. Scarlet did it or it was in the conservatory

P ∨ B

*remember, P ∨ B means P, B, or both

P = Ms. Scarlet did it
Q = Col. Mustard did it
R = Prof. Plum did it

A = The ballroom was used
B = The conservatory was used

W = The candlestick was used
V = The lead pipe was used

Logic should respect the original statement

It was Prof. Plum if the lead pipe was used

If lead pipe, then prof. plum

V	R	V⇒R
T	T	T
T	F	F
F	T	T
F	F	T

P = Ms. Scarlet did it
Q = Col. Mustard did it
R = Prof. Plum did it

A = The ballroom was used
B = The conservatory was used

W = The candlestick was used
V = The lead pipe was used

Logic should respect the original statement

If it wasn't Prof. Plum, then it couldn't have been the lead pipe

$\neg R \Rightarrow \neg V$

* simplified?

V	R	¬V	¬R	¬R ⇒ ¬V
T	T	F	F	T
T	F	F	T	F
F	T	T	F	T
F	F	T	T	T

T ⇒ F always False
otherwise true!

P = Ms. Scarlet did it
Q = Col. Mustard did it
R = Prof. Plum did it

A = The ballroom was used
B = The conservatory was used

W = The candlestick was used
V = The lead pipe was used

Logic should respect the original statement

If it wasn't the lead pipe, then it wasn't Prof. Plum

$\neg V \Rightarrow \neg R$

* relationship to other implications?

V	R	$\neg V$	$\neg R$	$\neg V \Rightarrow \neg R$
T	T	F	F	T
T	F	F	T	T
F	T	T	F	F
F	F	T	T	T

T ⇒ F always False
otherwise, True!

P = Ms. Scarlet did it
Q = Col. Mustard did it
R = Prof. Plum did it

A = The ballroom was used
B = The conservatory was used

W = The candlestick was used
V = The lead pipe was used

Logic should respect the original statement

It is not true that Col. Mustard did it in the ballroom

negation

$Q \wedge A$

$\neg (Q \wedge A)$

* can we distribute the not?

P = Ms. Scarlet did it
Q = Col. Mustard did it
R = Prof. Plum did it

A = The ballroom was used
B = The conservatory was used

W = The candlestick was used
V = The lead pipe was used

Logic should respect the original statement

It wasn't in the ballroom or the conservatory

$\neg (A \vee B)$

* can we distribute the not?
* truth table?