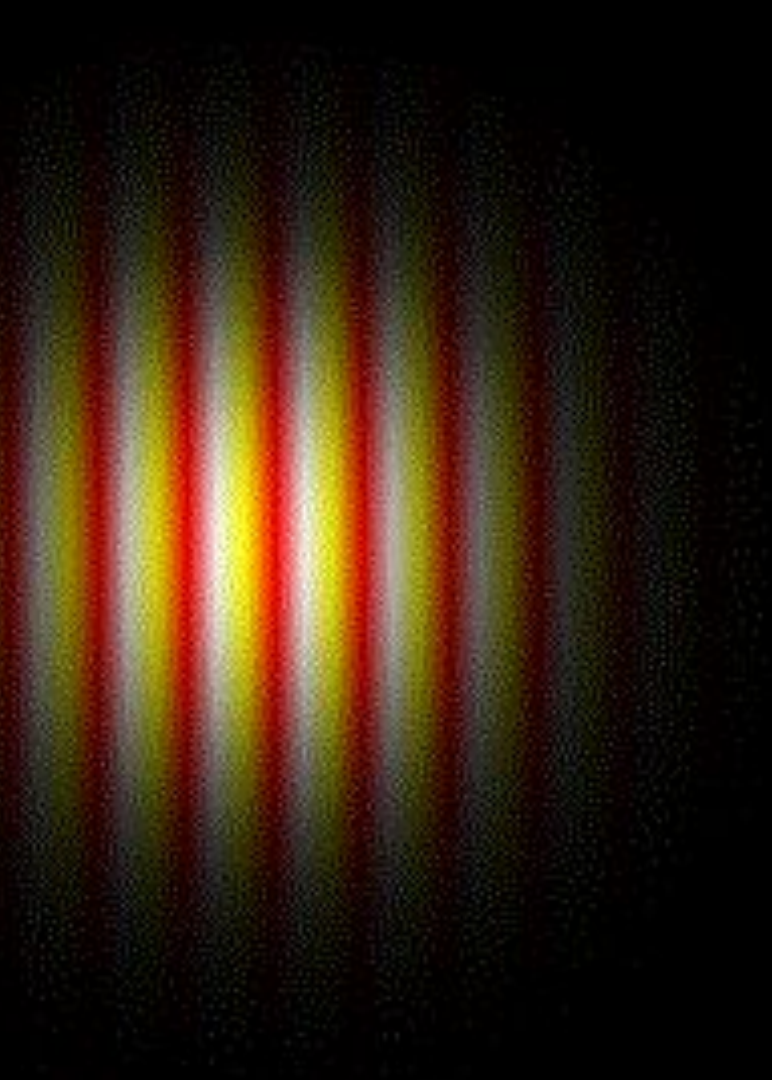


Truth-Tables (Pt. I)

Activity!

The Replacement Method

Steps:

1. Copy the formula, substituting the letter constants with the relevant truth-values.
2. Calculate the operators with the smallest scopes.
3. Calculate the main operator.

Use the replacement method to calculate the truth-values of the following:

(Key: R and L are true; M and O are false.)

a. $\sim[(O \vee M) \supset (R \equiv M)]$

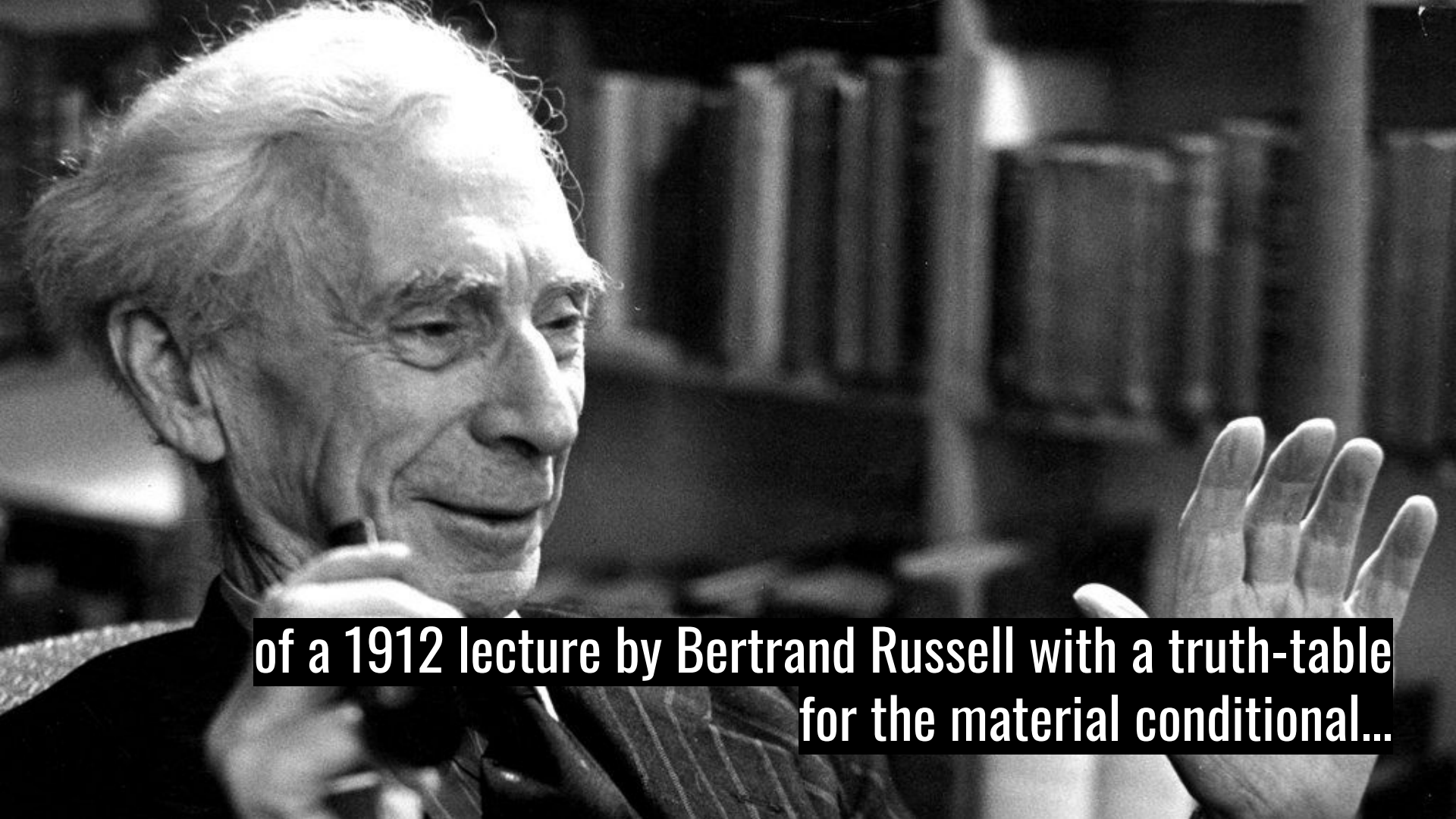
b. $[(R \,\&\, L) \vee (R \,\&\, M)] \,\&\, \sim(L \,\&\, M)$

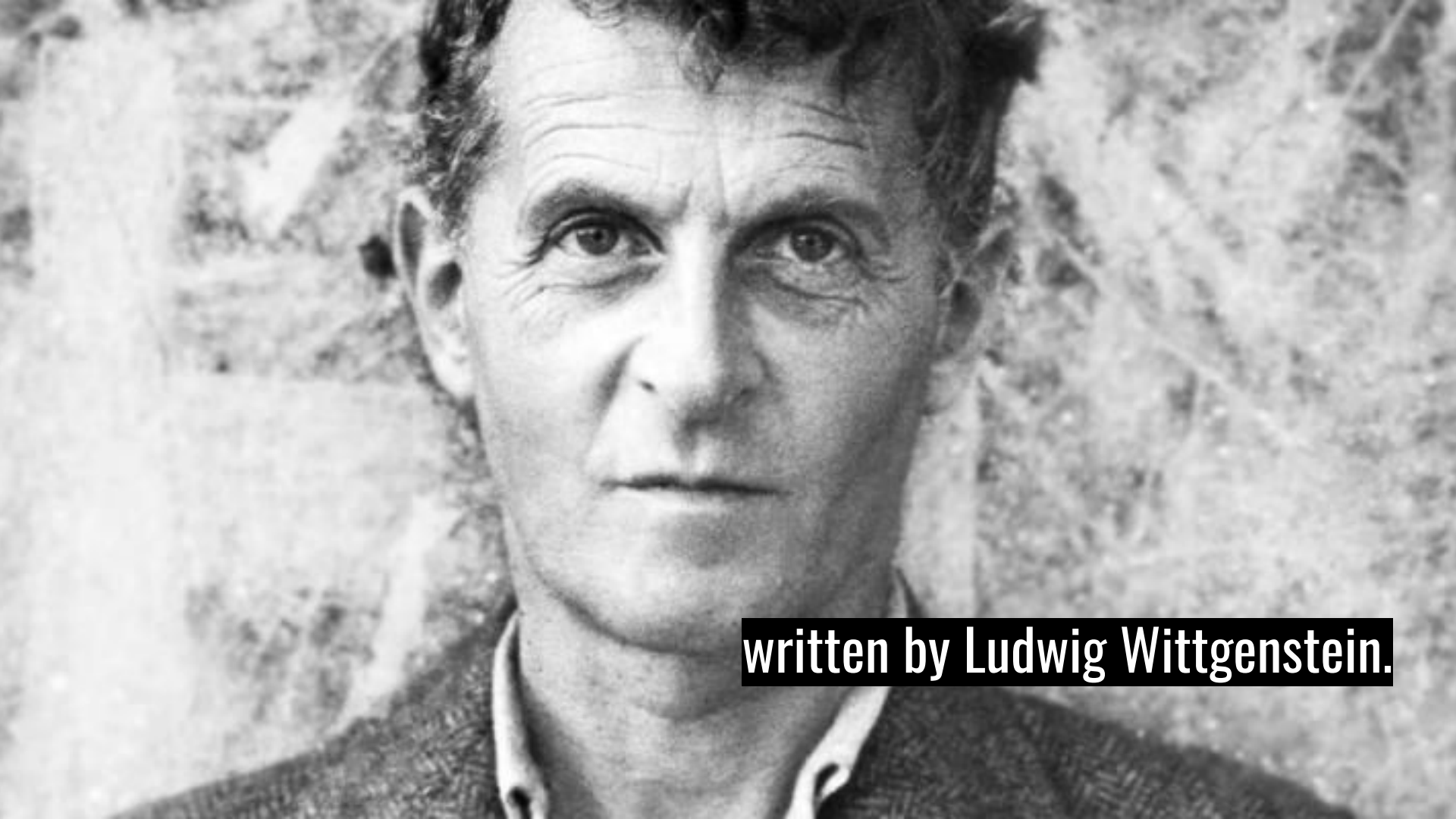
c. $(([R \equiv L] \,\&\, [M \equiv O]) \vee [M \supset R]) \supset O$

Question:
How do we know these argument forms are *always* valid?

Storytime!


In 1997, John Shosky discovers a page of a typed transcript...

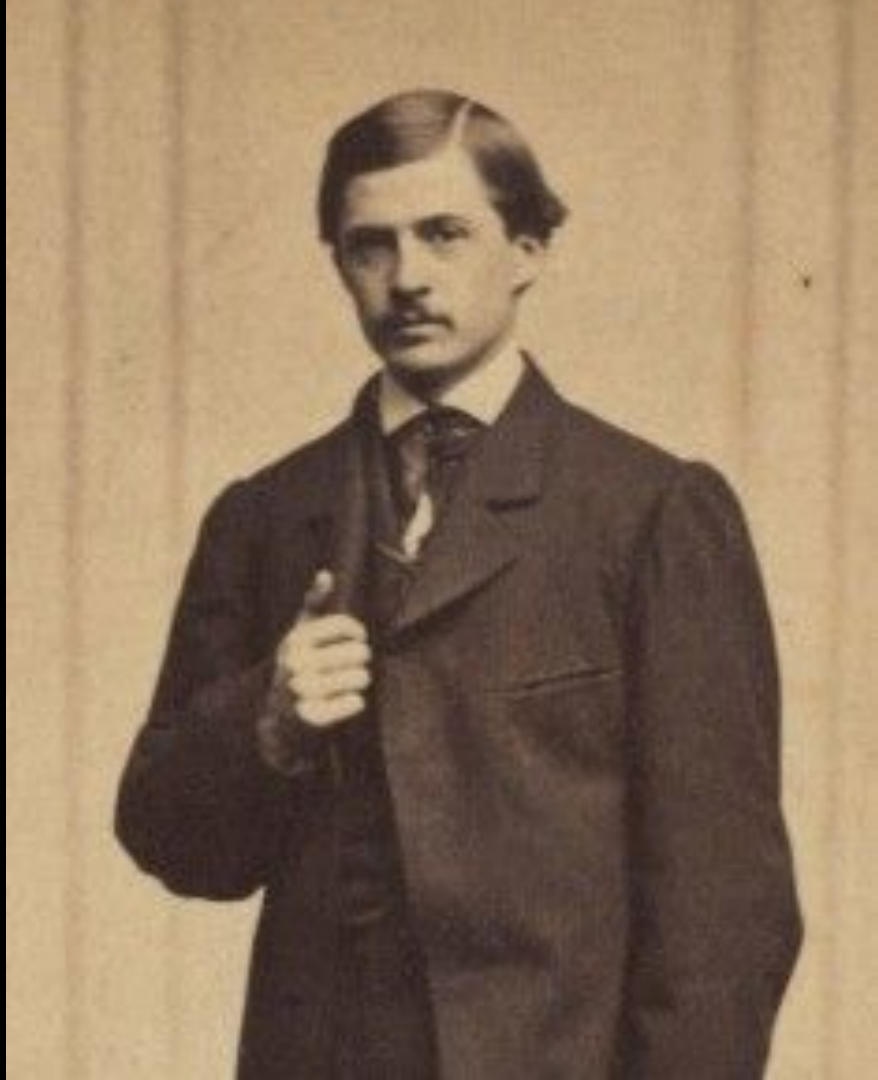

of a 1912 lecture by Bertrand Russell with a truth-table
for the material conditional...



written by Ludwig Wittgenstein.

P	Q	P and Q
T	T	T
T	F	F
F	T	F
F	F	F

But subsequent research by Irving Anellis (2012) showed that “an unpublished manuscript identified as composed by [Charles] Peirce in 1893 includes a truth table matrix that is equivalent to the matrix for material implication discovered by John Shosky.




WOW

Truth-table Analysis

...

Steps

#1: Write in the following:

- the sentence constants (in alphabetical order)
- the TL-symbolization of the sentence

A B (A & B) ≡ ~ B

#2: Draw the table.

Note: There should be enough columns for the truth-value assignments and all the sentence constants and connectives of the formula in TL; there should be enough rows for all the possible truth-values of the letter constants.

Rule: If there is one letter constant, there should be three rows; if there are two constants, there should be 5 rows; 3 constants, 9 rows; etc.

(In other words, $N = 2^x + 1$, where N equals the number of rows and *x* equals the number of sentence constants.)

A B (A & B) ≡ ~ B

A	B	(A	&	B)	≡	~	B

A	B	(A	&	B)	≡	~	B

A	B	(A	&	B)	≡	~	B

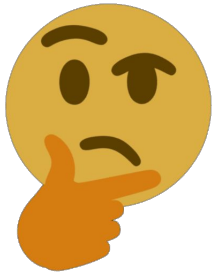
A	B	(A	&	B)	≡	~	B

#3: Fill in all possible truth-value assignments.

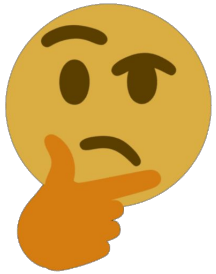
Rule: If there are two letter constants, input T-T-F-F for the first column then T-F-T-F for the second; if there are three letter constants, input T-T-T-T-F-F-F-F for the first column, then T-T-F-F-T-T-F-F for the second, then T-F-T-F-T-F-T-F for the third.

A	B	(A	&	B)	≡	~	B

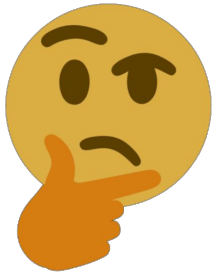
A	B	(A	&	B)	≡	~	B
T	T						
T	F						
F	T						
F	F						



A	B	C	(A	&	C)	≡	~	B



A	B	C	(A	&	C)	≡	~	B
T	T	T						
T	T	F						
T	F	T						
T	F	F						
F	T	T						
F	T	F						
F	F	T						
F	F	F						



A	B	C	(A	&	C)	≡	~	B
T	T	T						
T	T	F						
T	F	T						
T	F	F						
F	T	T						
F	T	F						
F	F	T						
F	F	F						

A	B	(A	&	B)	≡	~	B
T	T						
T	F						
F	T						
F	F						

A	B	(A	&	B)	≡	~	B
T	T	T					
T	F	T					
F	T	F					
F	F	F					

A	B	(A	&	B)	≡	~	B
T	T	T		T			T
T	F	T		F			F
F	T	F		T			T
F	F	F		F			F

#4: Find the main connective.

A	B	(A	&	B)	≡	~	B
T	T	T		T			T
T	F	T		F			F
F	T	F		T			T
F	F	F		F			F

#5: Calculate the values under the connectives with the smallest scope.

Note: If there is a tie for which is the smallest scope, compute the leftmost operator first.

A	B	(A	&	B)	≡	~	B
T	T	T		T			T
T	F	T		F			F
F	T	F		T			T
F	F	F		F			F

A	B	(A	&	B)	≡	~	B
T	T	T		T		F	T
T	F	T		F		T	F
F	T	F		T		F	T
F	F	F		F		T	F

A	B	(A	&	B)	≡	~	B
T	T	T	T	T		F	T
T	F	T	F	F		T	F
F	T	F	F	T		F	T
F	F	F	F	F		T	F

#6: Calculate the value of the main connective, i.e., the final column.

A	B	(A	&	B)	≡	~	B
T	T	T	T	T		F	T
T	F	T	F	F		T	F
F	T	F	F	T		F	T
F	F	F	F	F		T	F

A	B	(A	&	B)	≡	~	B
T	T	T	T	T		F	T
T	F	T	F	F		T	F
F	T	F	F	T		F	T
F	F	F	F	F		T	F

A	B	(A	&	B)	≡	~	B
T	T	T	T	T	F	F	T
T	F	T	F	F	F	T	F
F	T	F	F	T	T	F	T
F	F	F	F	F	F	T	F

A	B	(A	&	B)	≡	~	B
T	T	T	T	T	F	F	T
T	F	T	F	F	F	T	F
F	T	F	F	T	T	F	T
F	F	F	F	F	F	T	F

#7: Review your work.


DO STUFF

Construct a truth-table to calculate the truth-values of the following formulas:

a. $\sim[(O \vee P) \supset (O \equiv P)]$

b. $[K \supset C] \supset A$

c. $(T \,\&\, L) \vee (T \,\&\, M)$

Truth-table Analysis

...

Steps

#1: Follow all steps from SENTENCE EDITION.

Rule for Validity Test:

If there is any row on the truth-table that contains all true premises (or premise), but a false conclusion, then the argument is invalid.

If the table contains no row showing true premise(s) and a false conclusion, the argument is valid.

P Q P ⊃ Q P / Q

P1 P2 C

P	Q	P	⊃	Q		P	/	Q

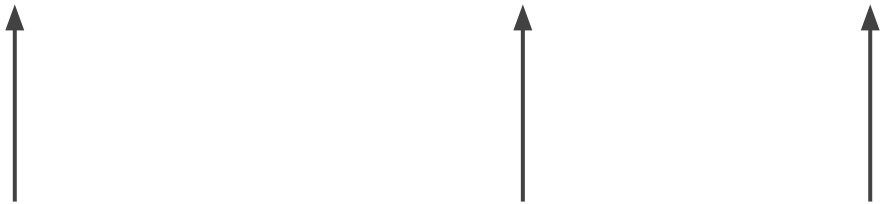
P	Q	P	⊃	Q		P	/	Q

P	Q	P	⊃	Q		P	/	Q
T	T							
T	F							
F	T							
F	F							

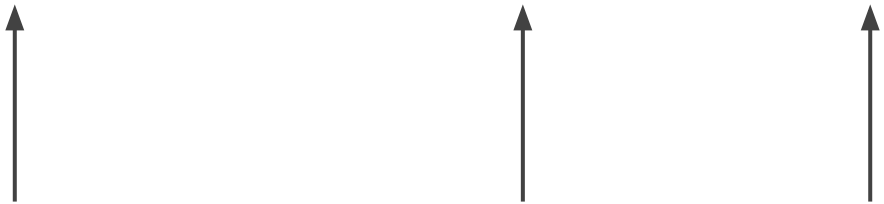
P	Q	P	⊃	Q		P	/	Q
T	T	T				T		
T	F	T				T		
F	T	F				F		
F	F	F				F		

P	Q	P	⊃	Q		P	/	Q
T	T	T		T		T		T
T	F	T		F		T		F
F	T	F		T		F		T
F	F	F		F		F		F

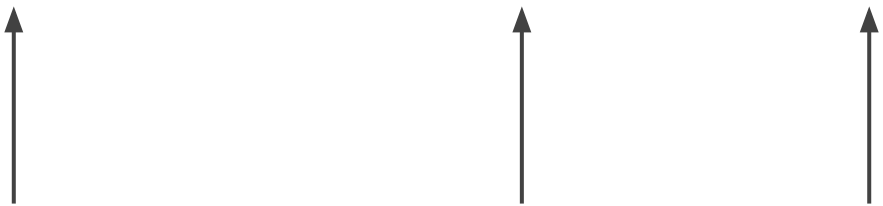
P	Q	P	⊃	Q		P	/	Q
T	T	T		T		T		T
T	F	T		F		T		F
F	T	F		T		F		T
F	F	F		F		F		F



P	Q	P	⊃	Q		P	/	Q
T	T	T	T	T		T		T
T	F	T	F	F		T		F
F	T	F	T	T		F		T
F	F	F	T	F		F		F



P	Q	P	⊃	Q		P	/	Q
T	T	T	T	T		T		T
T	F	T	F	F		T		F
F	T	F	T	T		F		T
F	F	F	T	F		F		F

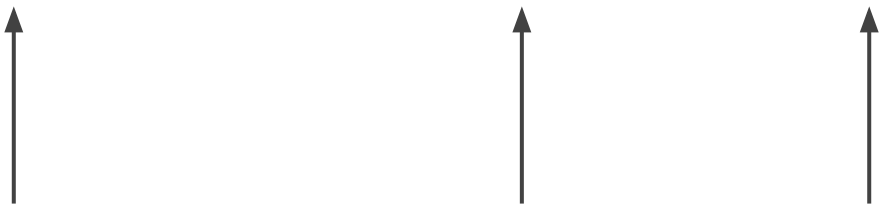


Rule for Validity Test:

If there is any row on the truth-table that contains all true premises (or premise), but a false conclusion, then the argument is invalid.

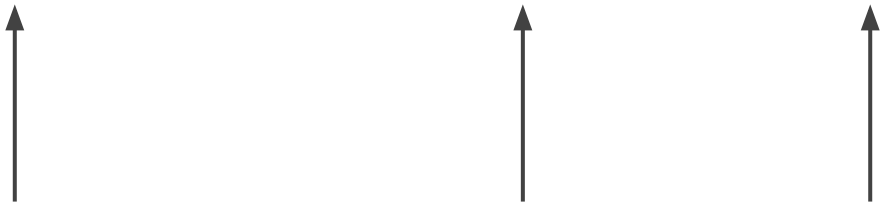
If the table contains no row showing true premise(s) and a false conclusion, the argument is valid.

P	Q	P	⊃	Q		P	/	Q
T	T	T	T	T		T		T
T	F	T	F	F		T		F
F	T	F	T	T		F		T
F	F	F	T	F		F		F



P	Q	P	⊃	Q		P	/	Q
T	T	T	T	T		T		T
T	F	T	F	F		T		F
F	T	F	T	T		F		T
F	F	F	T	F		F		F

P	Q	P	⊃	Q		P		Q
T	T	T	T	T		T		T
T	F	T	F	F		T		F
F	T	F	T	T		F		T
F	F	F	T	F		F		F




It's Valid!


DO STUFF


NOT
Sorry

Use truth-table analysis to assess the following for validity...

1. P ⊃ Q; ~P; ∴ ~Q
2. P ⊃ Q; Q; ∴ P
3. ~(P & Q); P; ∴ ~Q
4. P ⊃ Q; P; ∴ Q
5. P v Q; ~P; ∴ Q
6. P ⊃ Q; ~Q; ∴ ~P