Vocabulary:

Sentence letters: A, B, C, …, Z, A_1, B_1, …, Z_1, A_2,…,Z_2,…

Connectives: ⊃, ∨, ·, ≡, ~

Punctuation: '(', ')', '[', ']'

- Capital letters stand for STATEMENTS

→ WFF or not?

a) (~S ⊃ PQ)

b) [P ⊃ (Q~R)]

c) [~(~P) ⊃ Q]

d) [~([P · Q] ∨ R) ⊃ (P ≡ ~Q)]

e) ~[~P ⊃ (Q ∨ R)]

f) [(P ∨ Q) + ~S]

g) (P)

h) P · Q ∨ R

i) ≡P

<u>Conditional: P ⊃ Q</u>

- Read: if P, then Q

- Stylistic variants:

Order in which antecedent/ consequent appears in a sentence of English	Antecedent/Consequent	Consequent/Antecedent
	if P, Q	Q if P
	provided that P, Q	Q provided that P
	given that P, Q	Q given that P
	in case P, Q	Q in case P
	assuming that P, Q	Q assuming that P
	on the condition that P, Q	Q on the condition that P
	P only if Q	only if Q, P
	P only on the condition that Q	only on the condition that Q, P
	P only given that Q	only given that Q, P

Negation: ~P

- Read: not P

- Stylistic variants:

    * It is not the case that P
    If P means 'John is a student', then the following are stylistic variants:
    * John is not a student
    * John isn't a student
    * John fails to be a student
    * John is other than a student

Conjunction: P · Q

- Read: P and Q

- Stylistic variants:

    * P and Q
    * P even though Q   * Even though Q, P
    * P but Q
    * P although Q   * Although Q, P
    * Both P and Q
    If *P* means *Alfred is a student* and *Q* means *Alfred studies*, then the following are stylistic variants of *P · Q*:
    * Alfred is both a student and studies   * Alfred both is a student and studies
  ** Alfred is a student who studies   ** Alfred is a student that studies
   ** Alfred, who studies, is a student

Disjunction (inclusive): P ∨ Q

- Read: P or Q

- Stylistic variants:

    * P or Q
    * Either P or Q
    * P or else Q
    * Either P or else Q
    * P unless Q   * Unless Q, P
    * P except in the case that Q
    If *P* means *Alfred is a student* and *R* means *Alfred is an administrator*, then the following are stylistic variants of *P ∨ Q*:

* Alfred is a student or an administrator.
* Alfred either is a student or is an administrator.
* Alfred is either a student or an administrator.

Biconditional: P ≡ Q

- Read: P if and only if Q

- Stylistic variants:

    * P if and only if Q
    * P iff Q
    * P exactly on the condition that Q
    * P just in case that Q   * Just in case Q, P

Truth-table

- Conditional

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

- Disjunction

P	Q	P ∨ Q
T	T	**T**
T	F	**T**
F	T	**T**
F	F	**F**

- Negation

P	~P
T	F
F	T

- Biconditional

P	Q	P ≡ Q
T	T	**T**
T	F	**F**
F	T	**F**
F	F	**T**

- Conjunction

P	Q	P · Q
T	T	**T**
T	F	**F**
F	T	**F**
F	F	**F**

→ Provide a key and symbolize the following sentences:

1) Ina will not fail to be chosen as campaign manager.

2) Only if Rudolf doesn't lose the Ukrainian vote will he be elected.

3) If Ina is chosen as campaign manager, then Rudolf will be elected if he doesn't lose the Ukrainian vote.

4) It's not the case that if Alfred passes only if the lectures are exciting, then he passes if the lectures are exciting.

5) Alfred is a lover of logic who organizes his time.

6) Ruth is either a logician who enjoys chocolate or a mathematician who craves peanut butter.

7) Ruth will pass if, but only if, she either studies hard or isn't tired.

8) Either Alfred or Kurt, but not both Alonzo and Kurt, orders champagne.

9) Ruth studies hard unless she's tired, in which case she doesn't.

10) Unless either neither Sy nor Nye neigh or Bob and Babs both bray, none of them will beat Whirlaway.

→ Make the truth-table for the following sentences:

1) ~(P ∨ Q) ≡ (~P · ~Q)

2) [(P · Q) ∨ (~P · Q)] ⊃ (P ≡ Q)

3) (P ≡ R) ⊃ [(P ≡ Q) · (Q ≡ R)]

4) (~Q ⊃ ~P) ∨ [P ≡ (P · Q)]

5) (P ⊃ Q) ∨ (Q ⊃ P)