

Homework 1.

1. Represent the logical form of each of the following sentences. First identify the elementary component sentences, and abbreviate each with a (distinct) capital letter. (We have suggested letters after each sentence.) Then translate the original sentence using the logical connectives \vee , $\&$, \neg , \rightarrow for the words “or”, “and”, “not”, “if...then...”. Use parentheses to indicate the order of precedence of the different logical connectives.
 - (a) If Wittgenstein wrote the *Tractatus* then he did not invent the printing press. (W, I)
 - (b) It's just not true that if Jane Austen wrote it then it has a happy ending. (W, H) [Does this sentence admit an alternative symbolization?]
 - (c) Hegel was either a great philosopher or a raving lunatic. (G, R)
 - (d) Hegel was neither a great philosopher nor a great historian. (G, H)
 - (e) Sieglinde will survive, and either her son will gain the Ring and Wotan's plan will be fulfilled or else Valhalla will be destroyed. (S, G, F, D)
 - (f) Wotan and Alberic will not both be satisfied. (W, A)

2. Represent the logical form of the following arguments. (We have suggested letters for the elementary sentences.)
 - (a) Aquinas and Occam were not both great philosophers. But Occam was not a great philosopher. So, Aquinas was a great philosopher. (A, O)
 - (b) If according to the law a fetus is not a person, then nobody can be legally charged for murdering a fetus. Somebody can be legally charged for murdering a fetus. Therefore, according to the law a fetus is a person. (P, C)
 - (c) Either I will join Ivy and become a robber baron, or I will join Terrace and become a writer. If I become a writer, I will be poor. So, either I will become a robber baron or I will be poor. (I, R, T, W, P)

3. Prove that the following argument forms are valid. You may use the following rules of inference: MPP, &I, &E, \vee I, DN.

$$(a) (1) \quad P \& Q \quad / \quad P \vee Q$$

$$(b) (1) \quad (A \vee B) \rightarrow T \\ (2) \quad Z \rightarrow A \\ (3) \quad T \rightarrow W \\ (4) \quad Z \quad / \quad W$$

$$(c) (1) \quad A \rightarrow B \\ (2) \quad C \rightarrow A \\ (3) \quad W \rightarrow Z \\ (4) \quad C \& W \quad / \quad (B \vee D) \& (Z \vee E)$$

$$(d) (1) \quad (F \rightarrow G) \rightarrow \neg F \\ (2) \quad D \rightarrow (F \rightarrow G) \\ (3) \quad (A \rightarrow D) \& A \quad / \quad G \vee \neg F$$

$$(e) (1) \quad (A \rightarrow B) \rightarrow (C \rightarrow D) \\ (2) \quad (F \rightarrow A) \rightarrow (A \rightarrow B) \\ (3) \quad A \rightarrow (F \rightarrow A) \\ (4) \quad A \& C \quad / \quad D \& B$$

$$(f) (1) \quad (U \vee W) \rightarrow (\neg \neg T \rightarrow R) \\ (2) \quad U \& H \\ (3) \quad T \& \neg H \quad / \quad U \& R$$

4. Give informal counterexamples to the following invalid argument forms. (i.e., give arguments with these forms that have true premises and a false conclusion)

(a) (1) $P \vee Q$ / P

(b) (1) $(P \& Q) \rightarrow R$ / $P \rightarrow R$

(c) (1) $P \rightarrow (Q \vee R)$ / $P \rightarrow Q$

5. Is the following argument form valid? If you think it is valid, try to explain your intuition. If you think it is invalid, give an informal counterexample.

$$(A \vee B) \rightarrow (C \& D) \quad / \quad A \rightarrow C$$