pset1

Resources: Lecture 1 and Chapters 1 and 2 (pp 1-24) of *How Logic Works*.

A.

Represent the propositional structure of each of the following sentences. First identify the atomic component sentences (i.e. sentences that do not contain connectives) and abbreviate each with a distinct capital letter. We have suggested letters after the sentences. Then represent the form of the original sentence using the symbols $\vee, \wedge, \neg, \rightarrow$ for the connectives "or", "and", "not", "if…then…". Make sure to include parentheses, if necessary to disambiguate.

1. Elon Musk is neither a world-class chef nor a professional gamer. (C, G)
2. Pedro Pascal will win the Emmy only if he memorizes all his lines or buys the judges dinner. (E, M, B)
3. The Iron Throne will be destroyed, and either Jon Snow will become king and Westeros will prosper, or else it won't prosper. (D, K, W)
4. Barbie and Ken are not both correct about the real estate value of Dreamhouse. (B, K)

B.

Prove that the following argument forms are valid. The premises are to the left of the $\vdash$ symbol, the conclusion is to the right. You should number the lines of your proof, and each line must either be a premise (i.e. an assumption) or be justified by one of the following rules of inference: I, E, I, MP, MT, or DN.

1. $X \vdash (X \vee Z) \wedge (X \vee Y)$
2. $M \vdash N \vee (\neg\neg M \vee O)$
3. $\neg\neg D \rightarrow F, \neg F \vdash \neg D$
4. $U \rightarrow (T \rightarrow V), \neg V \wedge U \vdash \neg T$

C.

1. Explain what's wrong with the following "proof".

(1)	$P \vee (Q \wedge R)$	A
(2)	$P \vee Q$	1 E

2. If you were allowed to make up logic rules, do you think the following would be a good rule?

   > Any time a conjunction $A \wedge B$ occurs on a line, even as a part of a larger sentence, you may rewrite that line with only A in place of the conjunction $A \wedge B$, or with only B in place of $A \wedge B$.

   Explain your answer in a paragraph (no more than half a page).