PHIL 377 ASSIGNMENT 1

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1. Which of the following sentences is appropriate for logical analysis using our methods?

In each case explain why or why not.

(a) Will the next president be a republican?

No. This sentence is inappropriate for logical analysis because this is a question. A question is not counted as sentences. In logic, we are interested in sentences

(b) The president is a republican!

Yes. This sentence is appropriate for logical analysis because this is a sentence which can be either true or false.

(c) Make the next president a republican!

No. This sentence is inappropriate for logical analysis because this is an imperative, not a sentence. The command is neither true nor false.

(d) Beware of the president.

No. This sentence is inappropriate for logical analysis because this is an exclamation, not a sentence. The exclamation is neither true nor false.

2. Organize the following arguments into premise-conclusion form.

(a) Having cancer is good, for whatever is required by something that is good is itself

a good. Being cured of cancer is good, and being cured of cancer requires having

cancer.

P1: Whatever is required by something that is good is itself a good.

P2: Being cured of cancer is good

P3: Being cured of cancer requires having

cancer.

C: Having cancer is good.

(b) Let's assume Justice Betty is the Judge for the case, then after a long trial Peter will not be given a suspended sentence. I can tell you why I think that. First, the trial will be long unless the Crown prosecutor is brief, but he isn't. Furthermore, if Fred is the defense attorney, as good as he is, Peter will be found guilty. But Fred is the defense attorney. Justice Betty doesn't give out suspended sentences. So, finally, if Peter is found guilty, he will be sentenced.

P1: The trial will be long unless the Crown prosecutor is brief, but he isn't.

P2: Fred is the defense attorney.

P3: If Fred is the defense attorney, as good as he is, Peter will be found guilty.

P4: Justice Betty is the Judge for the case

P5: Justice Betty doesn't give out suspended sentences

P6: If Peter is found guilty, he will be sentenced.

C: After a long trial Peter will not be given a suspended sentence.

3. Each of the following questions has to be with the logical concepts discussed in class.

(a) Give a valid argument with a true conclusion and all false premises.

P1: All white dogs are clever.

P2: My dog Lima is white

C: My dog Lima is clever.

(b) Given an invalid argument with a true conclusion.

P1: Tom Cruise is an actor.

P2: Billie Eilish is a singer.

C: Gillman is a professor.

(c) Give a valid argument with a false conclusion and at least one true premise.

P1: Mango is either a dress or a fruit.

P2: Mango is not a dress.

C: Therefore, mango is a fruit.

(d) Given a non-mathematical example of a necessary truth.

People are living on the Earth.

(e) Give a mathematical example of a necessary falsehood.

1 + 1 = 3

4. Explain why, generally, we cannot use logic alone to show that a valid argument is sound. Give an example of an argument where logic alone can be used to show that the argument is sound.

We cannot use logic alone to show that a valid argument is sound because the sound argument is valid with true premises. If we only use logic alone, the logic might be correct and the argument is valid, but the premises are not true, which leads to the conclusion is also false.

Example:

P1: Beijing is a city in China.

P2: China is in Asia.

C: Beijing is a city in Asia.

5. Explain why in each case the sentence doesn't exhibit truth functional structure, or say why it does.

(a) It's possible that everyone in North America owns a smart phone.

The sentence does not exhibit truth functional structure. The sentence is a single sentence and which can be either true or false. The single part of the sentence is the sentence itself, it does not depend on anything else. This sentence is a basic truth functional structure level and we are looking at more complicated sentences.

(b) The coin must come up heads.

The sentence does not exhibit truth functional structure. This sentence has similar reasons as part a. The sentence is a single sentence and the truth functional value depends on itself, not other part of the sentence.

(c) The defendant relented only after much testimony was discredited.

The sentence exhibits truth functional structure. The sentence is a compounded sentence with 2 parts. The truth functional value of this sentence depends on 2 parts of the sentence. This sentence has more complexity in truth functional value.

(d) Jeff loves it that Nenshi is mayor, but not that Kenny is Premier.

The sentence exhibits truth functional structure with similar reasons to part c. This sentence also has 2 parts and truth functional values depends on 2 parts of the sentence.

6. At the world track and field games some people are musing about the performances of the German, Danish, and French teams. Consider the following dictionary:

F: The French team will win a gold medal.

G: The German team will win a gold medal.

D: The Danish team will win a gold medal.

S: The star German Runner is disqualified.

R: It rains during most of the games.

Provide formulas that formalize each of the following statements:

(a) Exactly one of the teams will win a gold medal.

((F & ~G) & ~D) v ((~F & G) & ~D) v ((~F & ~G) & D)

(b) At least two of the teams will win a gold medal.

((F v G) & D) v ((F v D) & G) v ((D v G) & F)

(c) If the star German runner is disqualified, the Germans will win gold only if neither

of the other teams win gold.

S --> (G --> (~F & ~D))

(d) The Danes will win gold unless it rains for most of the games, in which case they

won't, but the other two teams will win gold.

D v [(R & ~D) & (F & G)]

7. Provide dictionaries for the following arguments, and then provide formulas that formalize the arguments in standard form - using those dictionaries.

(a) Having cancer is good, for whatever is required by something that is good is itself a good. Being cured of cancer is good, and being cured of cancer requires having cancer. (2 points)

C: Having cancer is good.

W: For whatever is required by something that is good is itself a good.

B: Being cured of cancer is good

H: Being cured of cancer requires having cancer.

W

B & H

∴ C

(b) Let's assume Justice Betty is the Judge for the case, then after a long trial Peter will not be given a suspended sentence. I can tell you why I think that. First, the trial will be long unless the Crown prosecutor is brief, but he isn't. Furthermore, if Fred is the defense attorney, as good as he is, Peter will be found guilty. But Fred is the defense attorney. Justice Betty doesn't give out suspended sentences. So, finally, if Peter is found guilty, he will be sentenced. (3 points)

J: Justice Betty is the Judge for the case.

P: After a long trial Peter will be given a suspended sentence.

L: The trial will be long.

B: The Crown prosecutor is brief.

F: Fred is the defense attorney.

G: Peter will be found guilty.

D: Justice Betty gives out suspended sentences.

S: Peter will be sentenced.

J

(~B --> L) & ~B

(F --> G) & F

~D

G --> S

∴ ~P

(c) Look, if neither Jenny nor Fred play the lawyer, then Morris, the director, will not be upset. Moreover, if Morris isn't upset, the play will be successful. Thus, the play will get good reviews. Remember, both Jenny and Fred won't play the part of the lawyer, and plays get good reviews when and only when they are successful. (2 points)

J: Jenny plays the lawyer

F: Fred plays the lawyer

M: Morris, the director, is upset.

S: The play will be successful.

R: The play will get good reviews

(~J & ~F) --> ~M

~M --> S

(~J & ~F) & (R <--> S)

∴ R

8. Which of the following expressions is a formula of our formal language? Indicate those that are, and an explanation for those that are not.

(a) a formula

(b) This expression is not a formula because it requires 2 atoms for the conjunction.

(c) a formula

(d) This expression is not a formula because it requires connective between 2 atoms

(e) a formula

(f) This expression is not a formula because $\mathscr{A}$ is a metavariable, not an atom.

(g) a formula

(h) This expression is not a formula because it requires brackets outside (A & B) or (B & ~C) so that it will be clearer.

(I) This expression is not a formula because the { } are not valid brackets

(j) This expression is not a formula because it has 1 extra bracket in the beginning of the expression.

9. For each of the following formulas indicate which has the form ~A --> B. If it is of

that form provide the substitutions for the metavariables A, B.

(a) A --> B

Not the right form

(b) ~A --> B

Substitution: $\mathscr{A}$ = A; $\mathscr{B}$ = B

(c) ~A --> ~B

Substitution: $\mathscr{A}$ = A; $\mathscr{B}$ = ~B

(d) ~~A --> B

Substitution: $\mathscr{A}$ = ~A; $\mathscr{B}$ = B

(e) ~(A --> B)

Not the right form

(f) ~~A --> ~B

Substitution: $\mathscr{A}$ = ~A; $\mathscr{B}$ = ~B

(g) ~(~A --> B)

Not the right form

(h) ~~(A --> B) --> (C --> D)

Substitution: $\mathscr{A}$ = ~(A --> B); $\mathscr{B}$ = C --> D

(I) ~(A v ~B) --> ~(C & ~D)

Substitution: $\mathscr{A}$ = A v ~B; $\mathscr{B}$ = ~(C & ~D)

(j) ~(A <--> B) --> (~C --> D)

Substitution: $\mathscr{A}$ = A <--> B; $\mathscr{B}$ = ~C --> D

10. Consider the following truth value assignment:

(a) (A & C) --> (B v D)

T T T F F T T

Truth value of $\mathscr{A}$ is F

(b) (~ A v D) --> B

F T T T F F

Truth value of $\mathscr{A}$ is F

C) ~ A --> ~ (B & D)

F T T T F F T

Truth value of $\mathscr{A}$ is T

(d) ~ ~ A --> B

T F T F T

Truth value of $\mathscr{A}$ is F

(e) ~ (A --> (B --> (D & ~ C)))

F T T F T T F F T

Truth value of $\mathscr{A}$ is F

(f) ~ ~ A --> ~ B

T F T T T F

Truth value of $\mathscr{A}$ is T

(g) ~ (~ (A v (A & D)) --> B)

F F T T T T T T F

Truth value of $\mathscr{A}$ is F

(h) ~ ~ (A --> B) --> (C --> D)

T F T F F T T T T

Truth value of $\mathscr{A}$ is T

(I) ~ (A v ~ B) --> ~ (C & ~ D)

F T T T F T T T F F T

Truth value of $\mathscr{A}$ is T

(j) ~ (A <--> B) --> (~C --> D)

T T F F T F T T T

Truth value of $\mathscr{A}$ is T