Logic, Reasoning, and Persuasion 07; Deductive Reasoning Problem Set
- Due Date: Wednesday, October 1
- Points: 100 (112 possible points including extra credit, but scored out of 100).
- Material covered on this problem set: statements, truth-preservation, the implication machine, the chain machine, argument analysis.

1 | Identifying Statements (10 points)

Which of the following are statements? If a sentence *would* be a statement if you removed a word or two (but not more) from it, you can cross out the word(s) and say it is a statement. (2 points each)

1. The tallest mountain in the world is Mount Rushmore.
2. The World Trade Center being 1,776 feet tall.
3. Meet me in St. Louis tomorrow
4. You can meet me in New Brunswick tomorrow.
5. Remember, you can use the "statement test" to determine if a sentence is a statement.

2 | Truth Preservation (20 points)

Recall that an argument is **truth-preserving** if whenever the premises are true, the conclusion is true. The following argument is truth-preserving:

P1. Ella is taller than all other people.
C. Therefore, Ella is taller than most people.

If we assume that Ella is taller than all other people, then just based on the meanings of "all" and "most", we know Ella is taller than most people.

However, the following argument is *not* truth preserving:

P1. Ella is 150 feet tall
C. Therefore, Ella is taller than most people.

Why is it not truth-preserving? Because we can imagine a circumstance where Ella is 150 feet fall, but most people are 200 feet tall.

For each of the following arguments, say whether they are *truth-preserving*: whether whenever the premise is true, the conclusion is also true. If you think the argument is *not* truth-preserving, give a counterexample: a circumstance in which the premise is true but the conclusion is false. In each case, the premises are labeled P1, P2, etc. and the conclusion is labeled C. 2 points each.

1. P1. Hidden Grounds is the closest coffee shop to the philosophy department.
   C. Therefore, most philosophers at the department go to Hidden Grounds.

2. P1. Hidden Grounds is the closest coffee shop to the philosophy department.
   P2. Most philosophers at the philosophy department go to the closest coffee shop to the philosophy department.
   C. Therefore, most philosophers at the department go to Hidden Grounds.

3. P1. Using ChatGPT during an exam in this class is cheating.
    C. Therefore, you should never use ChatGPT during an exam in this class.

4. P1. Teachers have a responsibility to help students do hard things that will be good for them later.
    P2. With the rise of generative AI, thinking critically for oneself is starting to be a hard thing for students that will be good for them later.
    C. Therefore, teachers are starting to have a responsibility to help students think critically for themselves.

5. P1. With the rise of AI, teachers have a responsibility to make sure that students do not have a strong incentive to use AI in coursework.
    C. Therefore, students also have a responsibility to ensure they do not use AI in ways that jeopardize their learning, even when they are tempted to do so.

6. (Optional, 2 points extra credit) Unfortunately, the original text of the following problem has been scrambled, with each letter being replaced by some other letter. Codebreakers have been unable to decode the message except for the "ifs" and, "thens", and "therefore"s, but we do know that each letter is replaced by the same letter in the scramble (e.g. an "e" always maps to an "a.").
    P1. fvb mpnbylk vba aol jpwoly.
    P2. **If** fvb mpnbylk vba aol jpwoly, **then** fvb kpk leayh dvyr av mpnbyl vba aopz wyvislt.
    C. **Therefore**, fvb kpk leayh dvyr av mpnbyl vba aopz wyvislt.

3 | IMPLICATION MACHINE (20 POINTS)

3.1 | *Translating Into Implication Machine*

Translate the following sentences into instances of the implication machine: determine what the (statement 1) and (statement 2) are, then write it in the form

> 1. (statement 1)
> 2. **if** (statement 1) **then**
> → (statement 2).

1. (5 points) If you produce writing that looks or sounds like AI, you may be penalized.[1]
2. (5 points) Using generative AI is tantamount to plagiarism, since you are falsely representing the chatbot's paper as your own work.[2]

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1. A paraphrase of Lin, "Why We're Not Using AI in This Course." He writes: "Producing writing that looks or sounds like AI writing may be penalized as poor writing because it doesn't stand out as your authentic voice."
2. Actually the full sentence is "Your professor might think [using generative AI] is tantamount to plagiarism, since you are falsely representing the chatbot's paper as your own work." ~~Bonus question: why~~

3.2 | *Translating Out of Implication Machine*

Take the following arguments in Implication-Machine form and rewrite them as sentences that someone might present to you as an argument, without using the word "if". You may use each of the following words once total for this part: *because, since, as, so.* Try not to make your sentenes sound awkward!

> *(5 points)*
> 1. Most math students are using AI for assignments.
> 2. **if** most math students are using AI for assignments, **then** not using AI for math assignments puts one at a disadvantage.
> → not using AI for math assignments puts one at a disadvantage.

> *(5 points)*
> 1. As technology develops, emerging technologies will be able to do an increasing proportion of specialized tasks.
> 2. **if**, as technology develops, emerging technologies will be able to do an increasing proportion of specialized tasks, **then** training for specialized tests will be a worse education strategy than developing general competencies.
> → as technology develops, training for specialized tests will be a worse education strategy than developing general competencies.

4 | Chain Machine (20 points)

4.1 | *Part One (5 points)*

I've taken the sentence "I won't use Google Search because I want to protect my privacy" and implemented the General Strategy for the Chain Machine. Fill in the blanks in the last step by finding a middle sentence M that further explains.

> *1: Translate into Implication Machine*:
> 1. I want to protect my privacy.
> 2. **If** I want to protect my privacy, **then** I won't use Google Search.
> → I won't use Google Search.
> *2: Take "If P **then** Q" as conclusion of Chain Machine.*
> 1. **If** P **then** _____
> 2. **If** _____, **then** Q
> → **If** I want to protect my privacy, **then** I won't use Google Search.
> *3: Find a middle sentence M that further explains* the connection between the statements.

did I delete the first part? (5 points)

4.2 | Part Two (5 points)

I've taken the sentence "Our students are tempted to use ChatGPT because we have not successfully shown them why their education matters" and partially implemented the strategy above.[3] Do steps 2 and 3.

1: Translate into Implication Machine:
   1. we have not successfully shown [our students] why their education matters.[a]
   2. **If** we do not successfully show our students why their education matters, **then** they will be tempted to use ChatGPT.
   → Our students will be tempted to use ChatGPT.
*2: Take "If P **then** Q" as conclusion of Chain Machine.*
   1.
   2.
   →
3: Find a middle sentence M that further explains.

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a. Note: the brackets around [our students] means that I've replaced the word "them" with the noun that it refers to.

4.3 | Part Three (10 points)

Do all three steps of the General Strategy for the Chain Machine for the following sentence (which also appeared in the previous problem):
   If you produce writing that looks or sounds like AI, you may be penalized.

5 | Argument Analysis (30 points)

Consider this passage from Aylsworth and Castro:
   Imagine a philosophy professor gives you a writing assignment in which you are asked to critically assess an idea from an assigned reading. You now have a special opportunity to engage with an expert and present them with your reasoning about a subject that could have a substantial impact on your life. Perhaps you were assigned Singer's Animal Liberation. Rather than reading the text and writing your own paper, you ask ChatGPT to write a response to Singer. It may do an adequate job of generating a paper for a passing grade, but you have missed the opportunity to ask questions about your values—ones that might have changed the course of your life. And if the professor gives you critical comments (as we believe she should), then you have missed the chance to receive feedback about both your thinking process and your conclusions.

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3. Note: the original sentence from Aylsworth and Castro is "Our students are tempted to use ChatGPT, at least in part, because we have not successfully shown them why their education matters." I've deleted "at least in part" because it makes the task more complicated. Is this okay to delete? Why or why not?

5.1 | *Identifying Implication Machines (10 points)*

There are **three** portions of this passage that can be analyzed in terms of the Implication Machine. Identify **one** of them and write it in the format of the Implication Machine using the General Strategy for the Implication Machine (5 points each). Note that you may have to rephrase some parts of the passage in order to put it in the right form.

> 1. P
> 2. if P then Q
> $\rightarrow$ Q.

5.2 | *Improving Chain Machines (10 points)*

For the passage you analyzed above in terms of the Implication Machine, follow the General Strategy for the Chain Machine:
  1. Translate the passage into the Implication Machine (you did this already in the last part of the problem).
  2. Take the "**If** P **then** Q" part as the conclusion of the Chain Machine.
  3. Find a middle sentence M that further explains the connection between P and Q, and write the final argument in the following form:
      (a) **If** P **then** _____ (M)
      (b) **If** _____ (M), **then** Q
      $\rightarrow$ **If** P , **then** Q

5.3 | *General Analysis (10 points)*

Restate the conclusion that Aylsworth and Castro are arguing for in the passage. You may consider looking back at the paper to see where the passage appears. You can choose as your sentence a direct quote from Aylsworth and Castro, if you cite it, and if it is a **single** sentence.

6 | Extra Credit: Interacting with AI (up to 10 points)

Without special prompting, both Claude and ChatGPT get most, but not all, of the parts of Problem 1 correct.

For 5 or 10 points of extra credit, do one of the following:

1. for 5 points: first, ~~have the AI chat bot~~ go back and forth with a generative AI chat bot, guiding it until it gets all the answers correct. Explain to me in a paragraph or two what you did.

2. for 10 points: Come up with a prompt that, when given to an AI chat bot together with the questions, leads it to give all ~~ten~~ correct answers without you   five correct answers having to correct it (I've tried a little bit at this and haven't succeeded, but you may be better at prompt engineering than I). You are not allowed to tell the chat bot which answers are correct or not. For the full 10 points, your prompt should be a *generalizable* prompt: it should be instructions so that the chat bot could get the correct answers even on different but similar questions. Then (1) give me the full prompt and (2) explain a bit about how you generated it.

Please only submit one of these to me to grade (although it may be worth it for you to do both!). You can get more than 100 points total for the problem set.