Student's affirmation: I certify that I have neither taken help in completing this exam nor helped anyone else with this exam. I have never discussed this exam with anyone other than the instructor and TA. I have not used ChatGPT, Llama, or other AI tools to create or influence my solutions.

(Signature) _____

Mandatory: Affirmation and signature on the first page; name on every page; submission as PDF.
If you make assumptions about any problem, state them, but be prepared to justify why they were necessary.

Problem	1	2	3	4	5	Total
Points:	16	20	24	18	22	100
Score:						

This exam has 5 problems, for a total of 100 points.

Throughout, I prefer that you think afresh but if you come across a source on which you base your answer, please be sure to cite it. (Some problems ask for a specific author or source.)

1. (16 points) Mark the following statements true or false. Provide a short explanation of about 10–20 words for each. You can and should provide a source where appropriate. Where the statement is about a paper, please specify the corroborating part of the paper (e.g., "Page 32, second para, lines 4–6").

    A. Applying Kahneman and Tversky's prospect theory helps us understand why beauty contests of the sort we studied turn out the way they do

    B. Condorcet cycles are always balanced in terms of comparisons between alternatives

    C. In a three-candidate contest in three districts, it's possible that one of them wins each district by a plurality but loses when the districts are combined

    D. A dialectical commitment would best model a new clause in the juggling contract that CCD acknowledges UJC could substitute Krusty the Clown for J. Woods (UJC's main juggler)

    E. A project team member who respects all professional norms, e.g., by doing their share of the work on time, would escape sanctioning by their teammates

    F. The autonomy of participants in a sociotechnical system suggests that a participant, Alex, can autonomously authorize another participant, Zack, to use Alex's headphones

    G. Muzafer Sherif's Robber's Cave study at a camp for boys suggests that the group behaviors they observed would not have arisen if they had studied girls of the same age group

    H. Muzafer Sherif's experiments of the social influence on autokinetic effect indicate that people resist implicit suggestions from one another

2. Consider an electoral setting where three or more candidates vie for one position.

    Recall that a *voting method* takes as input a profile (set of ballots, each with a total ranking) and produces a total social ranking. As before, we can iteratively apply a method that produces a winner to produce a total social ranking.

    Define *extremality* as the property of a voting method that if all ballots in its input profile place a candidate at the top or the bottom position, the voting method produces a social ranking in which the candidate is in the top or the bottom position.

    For the following voting methods, either demonstrate via an example (smaller is better) where extremality is *false* or provide a proof that the voting method necessarily satisfies extremality. If you give an example, it should not rely on breaking ties in any step.

    (a) (10 points) Borda.

   (b) (10 points) STV under Coombs' rule.

3. (24 points) The following text pertains to patient health data.

> A person creates an account with a bank. For simplicity, let's assume that the only relevant information associated the account holder with a current balance at the bank.

Consider the following requirements to be captured as norms:

- Anyone can request but may or may not receive an account holder's financial information from the bank.
- The account holder prohibits the bank from sharing their financial information with anyone.
- The account holder may lift the above prohibition, e.g., when they run for elected office.

   (a) State the relational schemas (i.e., tables) along with some of their important attributes (i.e., columns in the corresponding table) needed to evaluate the above norms. The schemas could capture information such as signup, requestBalance, and receiveBalance, and others that you need.

   (b) State the prohibition formally by describing the parties involved, antecedent, consequent, and any other such elements that you need.

   (c) Give one scenario (entries in your tables) that results in the prohibition being violated.

   (d) State the lifting of the prohibition as a norm (is it an authorization or a power?) by describing the parties involved, antecedent, consequent, or other such elements that you need.

   (e) Give one scenario (entries in your tables) that results in the lifting of the prohibition and its subsequent effect on a balance request.

4. (18 points) Express each of the following arguments using the framework proposed by Toulmin.

   (a) A persuasion argument to have NC State start a study abroad program in Lithuania based on one of Walton's argumentation schemes (consult his website if the summary in the slides is not sufficient). Explain the argumentation scheme you use and its elements and two associated critical questions. Explain what makes your solution a persuasion argument.

   (b) A deliberation argument on whether to enroll in a study abroad program in your third semester at NC State based on one of Walton's argumentation schemes. Explain the argumentation scheme you use and its elements and two associated critical questions. Explain what makes your solution a deliberation argument.

5. Consider the atomic propositions p, q, and r and any Boolean formulas built over these propositions. Here, the symbols $\perp$, $\neg$, $\vee$, $\wedge$, $\rightarrow$, and $\leftrightarrow$ respectively mean falsehood, negation, or, and, implies, and is equivalent to.

   (a) (10 points) Consider the following pairs, each consisting of a set of premises and a conclusion. Determine whether each pair meets three conditions for a formal argument, $\langle \Phi, \alpha \rangle$, as defined by Besnard and Hunter. Place your answer within the appropriate tabular cell below but feel free to use additional space elsewhere if you need any for explanations. Explain each answer.

	$\Phi \nvdash \bot$	$\Phi \vdash \alpha$	Φ is minimal among Ψ such that $\Psi \vdash \alpha$
$\langle \{p, p \wedge q\}, p \vee q \rangle$			
$\langle \{\neg p \wedge q, p \leftrightarrow q\}, q \rangle$			
$\langle \{p \vee q, p \vee \neg q, p \vee r, p \vee \neg r\}, p \rangle$			
$\langle \{p, \neg p \vee q \vee r\}, \neg p \rangle$			

(b) (12 points) Following the definitions given by Besnard and Hunter, identify which of the following row arguments defeat, rebut, undercut, or are more conservative than which of the column arguments. Explain each answer.

	$\langle \{\neg p \wedge q\}, q \rangle$	$\langle \{\neg p \wedge \neg q\}, \neg p \wedge \neg q \rangle$	$\langle \{p \vee q, \neg p \vee q\}, q \rangle$
$\langle \{p \vee q\}, p \vee q \rangle$			
$\langle \{p \vee q, p \leftrightarrow q\}, q \rangle$			
$\langle \{\neg p \wedge \neg q\}, \neg p \wedge (p \leftrightarrow q) \rangle$			