Problem	1	2	3	4	Total
Points:	30	10	30	30	100
Score:					

This homework assignment has 4 problems, for a total of 100 points.

1. (30 points) Identify all of the following statements that are true.
   A. According to Tversky and Kahneman, the *decision weight* that humans place on a probability is lower than what the traditional economics model of expected utility theory predicts
   B. According to Tversky and Kahneman, *framing* is what explains why more people who lost $10 before buying a $10 ticket for a play will buy the ticket than people who lost a $10 ticket will buy another $10 ticket
   C. Prospect Theory, as proposed by Tversky and Kahneman, captures the idea that humans generally weigh prospective losses more heavily than prospective gains
   D. Tversky and Kahneman differ from Herbert Simon's theory of bounded rationality by postulating that it is not the cognitive complexity or cognitive effort required by decisions that explains how people deviate from economic models of rationality but to a large extent how people assess probabilities of losses relative to probabilities of gains
   E. Anscombe's paradox describes the situation where a majority of the voters do not like a majority of the decisions
   F. The Paretian dilemma in judgment aggregation describes a situation where the aggregation of individual preferences is unanimous in one direction whereas the social preferences are unanimous in the opposite direction
   G. Loosely following Walton's descriptions, the precautionary principle corresponds to an Argument from Positive Consequences
   H. The autonomy of participants in a sociotechnical system suggests that a participant, Al, can autonomously permit another participant, Zhang, to use Al's resources
   I. Our life cycle for norms indicates that whether a norm is satisfied or violated depends upon a combination of its antecedent and consequent being true or false
   J. In the proposed architectural pattern, a principal may violate an authorization and suffer the risk of a potential sanction
   K. A scientist who violates professional norms, such as of crediting other researchers, may be sanctioned by others in the professional community
   L. A scientist who does not violate professional norms would not be sanctioned by others in the professional community
   M. If Hongying sanctions Ricky for good reason (as accepted by a majority of the class), she would not herself be sanctioned by Mehdi
   N. Muzafer Sherif's experiments of the social influence on autokinetic effect indicate that people resist implicit suggestions from one another
   O. Muzafer Sherif's Robber's Cave study suggests that people tend to positively attach to one other if placed in situations that demand cooperation
2. (10 points) Consider the following profile of preference ballots cast by 100 voters. The header of each column is the number of ballots cast for the preference order (best to worst) of names in the remainder of the column.

33	**16**	**3**	**8**	**18**	**22**
Arjun	Bhise	Creager	Creager	Denae	mEhdi
Bhise	Denae	Denae	mEhdi	mEhdi	Creager
Creager	Creager	Bhise	Bhise	Creager	Bhise
Denae	mEhdi	Arjun	Denae	Bhise	Denae
mEhdi	Arjun	mEhdi	Arjun	Arjun	Arjun

List the winner computed by each of the following voting methods.

Method	**Winner**
Borda count: obtains highest count	
Condorcet: beats every other alternative head-to-head	
Plurality: gets most votes	
Plurality with Runoff: one of two top vote getters in the first round who beats the other head-to-head	
Single Transferable Vote: majority winner after retiring loser in each round and crediting next best surviving choice with each of the loser's ballots	

3. Consider the first of the proofs of Arrow's Theorem given by Geanakoplos—this is the proof we discussed in class. Consider the following preference aggregation method that produces a social preference order from a *profile*, i.e., a set of individual preference orders. Assume that each voter provides a complete ranking of all the alternatives under consideration.

   - Considering all of the ballots in reverse
     - Apply Single Transferable Vote on the reversed ballots to determine the least favorite alternative, breaking ties randomly (though that won't matter in this problem)
     - Then erase the identified least favorite alternative from all of the ballots and compute the next least favorite alternative
     - Iterate until all alternatives have been erased
   - Determine the social preference order in reverse order of the alternatives being identified above

   Develop a concrete example of this proof that applies the above preference aggregation method.

   (a) (10 points) Propose a profile that involves four or five alternatives. Choose as many voters as you need (the fewer the better). Make sure that ties do not arise in your example in any round of the above preference aggregation method.

   (b) (20 points) Apply the steps in Geanakoplos' proof, showing the various profiles mentioned in that proof, proceeding at least as far as a point where at least one of the assumptions of Arrow's theorem fails to hold or the conclusion of the theorem holds. That is, as an alternative to exercising the proof, you could provide an example showing an assumed property failing for this method.

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

(a) (15 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.

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

(b) (15 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.

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