

**Homework 7 CS 6100 (can be done in groups of 1,2, or 3)
Old Exam 2 (Fall 2007) + two questions**

Fill in the blank using the technical description (1 point each)

1. In negotiation, the situation of “if I can help you without hurting me, I will” is termed -
_____.
2. In negotiation, if the goal is to make sure I am no worse off by participating in the negotiation, it is termed _____.
3. A bidder whose sole goal is to bid up the price (without ever buying the item) is termed _____.
4. In an auction, if an item is worth different amounts to different bidders, it is termed _____.
5. In an English auction, paying less for an item than it is worth is termed _____.
6. In an auction, if I strategize about what others will do in order to get the best deal, it is termed _____.
7. In negotiation, all possible deals which are individually rational and pareto optimal is termed _____.
8. Deal A _____ deal B, if it not worse for the any other participant.
9. A _____ task is an imaginary task than can be faked on demand.
10. A domain is termed _____ if $c(X \cup Y) = c(X) + c(Y) - c(X \cap Y)$.

Multiple Choice (3 points) Pick the single best answer.

- 1) What is the main **disadvantage** of the Dutch auction over the Vickrey auction?
 - a) It generates less consumer surplus for the buyer.
 - b) Time is wasted in counter speculation
 - c) There is no dominant strategy.
 - d) It is not pareto optimal
 - e) All of the above

2) For the Battle of the Sexes interaction shown below, if the row player selects Opera with a $\frac{2}{3}$ probability, what is the column player's best response?

Battle of the Sexes		
	Opera	Football
Opera	3, 2	1, 1
Football	0, 0	2, 3

- a) Opera
- b) Football
- c) All responses are equally good
- d) Opera with a probability of $\frac{1}{3}$

- 3) What does Arrow's Impossibility Theorem tell us?
- a) That it is impossible to determine the winner of an election in polynomial time.
 - b) That it is impossible to achieve rotational symmetry.
 - c) That there can't be a completely fair voting mechanism.
 - d) That it is impossible to achieve revenue equivalence.
- 4) A person in a game show is offered the choice between the following offers [$\frac{1}{5}$, \$200; $\frac{4}{5}$, \$500] or [1, \$420]. The person accepts the [$\frac{1}{5}$, \$200; $\frac{4}{5}$, \$500] offer. What would you conclude:
- a) The person is risk averse.
 - b) The person is risk neutral.
 - c) The person is risk seeking
 - d) The person is maximizing expected revenue.
- 5) A person in a game show is offered the choice between the following offers [$\frac{1}{5}$, \$2000; $\frac{4}{5}$, \$100] or [1, \$420]. The person accepts the [1, \$420] offer. What would you conclude:
- a) The person is risk averse.
 - b) The person is risk neutral.
 - c) The person is risk seeking
 - d) Utility maximization is employed.
- 6) Quoting Borda, "My scheme is only intended for honest men." What did he mean?
- a) Women didn't vote when Borda suggested the protocol.
 - b) If everyone gives a true ranking, the method is completely fair.
 - c) Insincere voters can gain advantage.
 - d) If you refuse to rank a candidate at all, other candidates will be disadvantaged.
- 7) Under multiple issue negotiation, what concern emerges which is not found in single issue negotiation?
- a) It is not clear what a true concession is.
 - b) It may not be clear what is up for negotiation.
 - c) The combination of issues can be huge.
 - d) All of the above
- 8) In a reverse auction, phone companies are bidding to supply telephone service to a large company. The bids represent the cost at which the company agrees to provide the service. In which type of auction will companies have *no* incentive to invest effort in strategic behavior in the bidding?
- a) Vickrey
 - b) Dutch
 - c) English
 - d) First Price Single Bid
 - e) a) and c)
 - f) b) and d)

- 9) In evolutionary solutions using random pairings, in a given round agents of type A produce 20% of the utility and agents of type B produced 40% of the utility, while agents of types C, D and E share the remaining 40% of utility. In the next generation what would you expect to be true:
- Agents of type A would be 20% of the agents
 - Agents of type A would decrease while agents of type B would increase
 - Agents of types C, D and E would eventually disappear
 - There is nothing you can say without more information
- 10) In the following strategic-form game, what strategy can be eliminated via iterated elimination of strictly-dominated strategies?

	L	C	R
T	2,0	1,1	4,2
M	3,4	1,2	2,3
B	1,3	0,2	3,0

- Row T
- Row M
- Row B
- Column L
- None of the above

Short Answer:

1. (15 points) Consider a combinatorial auction. This is a sealed bid auction in which each bidder offers a price for a set of goods (of the bidder's choosing) rather than placing a bid on each item separately. There is no limit on the number of bids a buyer can make. The auctioneer selects a set of these combinatorial bids which raises the most revenue without assigning any object to more than one bidder. Compare this mechanism with an English auction in which the auctioneer selects which items to sell together. What are the advantages and disadvantages of each?

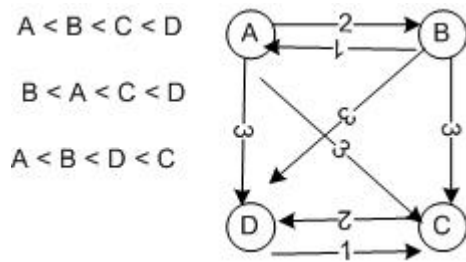
2. (15 points) Two companies (A and B) sell mineral water. Each company has a fixed cost of \$5000 per period, regardless of how many bottles they produce. The two companies are competing for the same market and each firm must choose a high price (\$2 per bottle) or a low price (\$1 per bottle). Here are the rules of the game:

- 1) At a price of \$2 per bottle, 5000 bottles can be sold for a total revenue of \$10000.
- 2) At a price of \$1 per bottle, 10000 bottles can be sold for a total revenue of \$10000.
- 3) If both companies charge the same price, they split the sales evenly between them.
- 4) If one company charges a higher price, the company with the lower price sells the whole amount and the company with the higher price sells nothing.
- 5) Payoffs are profits -- revenue minus the \$5000 fixed cost.

Fill in the table below with utilities and indicate what will likely happen:

	Cheap (B)	Expensive (B)
Cheap (A)		
Expensive (A)		

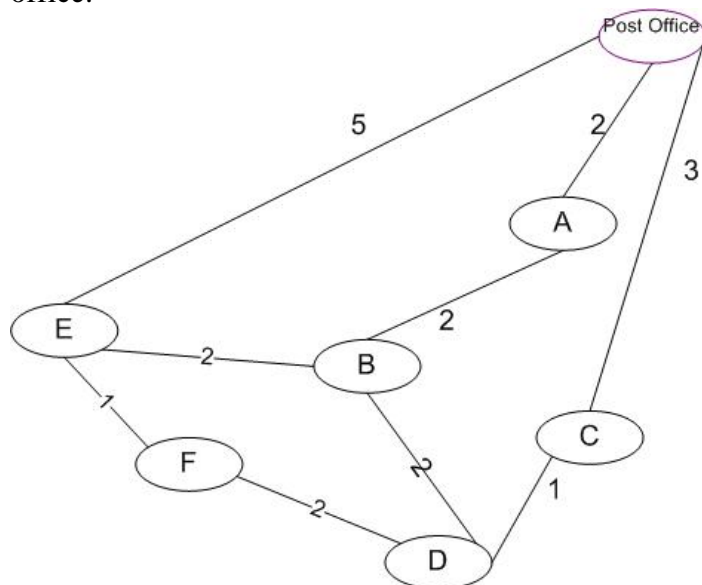
3 (15 points) A friend has the following suggestion for determining a social choice function. Given individual rankings for candidates (in which $A < B$ means A is preferred to B), every time A is preferred to B we place an arc from A to B in the graph. Arcs are labeled with the number of times they occur. For the example below, since D is preferred to C 1 time, the arc from D to C is labeled with a 1.



(a) Give a good suggestion for turning this type of diagram into a social choice ordering in which you order all the candidates from best to worse using all of the preferences.

(b) Compare your solution to the Borda solution.

4. (15 points) Consider the following diagram of a letter carrier domain in which Agent 1 delivers to E and D and must return to the post office. Agent 2 delivers to B and must return to the post office.



(a) If we are restricted to all-or-nothing deals, what deal would be struck? Show the actual p that would be used.

(b) Without showing actual numbers, explain how a decoy could be helpful for agent 1.

5. (10 points)

Consider the following values for coalitions in which we give various payments to the participants.

(a) What solutions are in the core?

(b) What is the Shapley solution?

Coalition	Value
1	2
2	2
3	4
12	5
13	7
23	8
123	9

	Utility 1	Utility 2	Utility 3
123			
132			
213			
231			
312			
321			
Average			

6. (10 points) Consider the following values for coalitions in which we give various payments to the participants.

(a) What solutions are in the core?

(b) What is the Shapley solution?

Coalition	Value
1	1
2	2
3	2
12	4
13	3
23	4
123	6

	Utility 1	Utility 2	Utility 3
123			
132			
213			
231			
312			
321			
Average			

