

Name: _____

This test is **open book, open notes**, but there can be no sharing of any material, and no communication except with me. You can use the Internet, but only as a library. If you are not sure if something is allowed, check with me.

Many questions in this quiz use the database schema and sample instance depicted below. The `AuctionItems` table records information about items in a silent auction (as used by *eBay* and similar services). For each item, the table records a unique identifier `id`, a brief description `bdesc`, a longer description `ldesc`, the starting price for bidding `sprice`, the shipping and handling charge `shcost`, and the date and time at which the auction ends `etime`. The `Bids` table holds information about bids placed on the items in the auction. For each bid, the table records a unique bid confirmation number `conf`, the name of the bidder `bidder`, the identifier of the item on which the bid is placed `item`, the amount of the bid `amount`, and the date and time the bid was placed `btime`. The type of each attribute appears directly below its name. *Primary key attributes* are underlined.

When asked for queries, you must provide answers that work for all possible database instances, not just the example instance depicted below. For brevity, relational algebra expressions abbreviate the schemas of the `AuctionItems` and `Bids` tables as $A(I, B, L, P, S, T)$ and $B(C, B, I, A, T)$, respectively.

The following tables are repeated on the last page of the quiz. You may detach that page and use it for reference. There is no need to reattach it

AuctionItems

<u>id</u>	bdesc	ldesc	sprice	shcost	etime
char(10)	varchar(100)	text	decimal(6,2)	decimal(6,2)	timestamp
101	Amazing Aardvark	A pet...	101.99	51.00	2005-03-10 11:00:00
115	Befuddling Bees	Ten for...	10.99	11.00	2005-03-11 17:00:00

Products

<u>conf</u>	bidder	item	amount	btime
char(12)	varchar(100)	char(10)	decimal(6,2)	timestamp
101101	alice01	101	105.00	2005-03-10 01:00:00
101221	bob02	101	107.00	2005-03-10 01:05:00
101335	alice01	101	125.00	2005-03-10 01:10:00

- (1 pt.) Write your name in the space provided above.

5. (5 pts.) Write an extended relational algebra query that is equivalent to the query of Question 4.
6. (10 pts.) Write a SQL query to find the highest and lowest bidders for each item listed in `AuctionItems`. The result should consist of tuples of the form (i, b, b_h, b_l) , indicating that the item with identifier i and brief description b has b_h as the highest bidder and b_l as the lowest bidder. You may assume that different bids on the same item have different amounts. If an item does not have any bids, b_h and b_l should be replaced by the string `--` for that item's tuple in the result. (Hint: As always, you may define and use views to simplify your query.)

7. (10 pts.) Write an extended relational algebra query that is equivalent to the query of Question 6.

8. (10 pts.) Write a relational algebra query to find the bidders who have bid on every item whose auction ends on 2005-03-10. (Each such bidder is required to have bid on all such items.)

Scratch page

Material here will not be graded. You may detach and discard this page.

AuctionItems

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