

Stat 155 Homework # 2 Due February 10

Problems:

Q 1 Consider a 2 person first price auction with reserve price r (in such an auction the highest bidder pays his bid and wins the item if it is greater than r while if neither bidder bids more than r then no one gets it). Suppose that the agents have independent $U[0, 1]$ values.

- (a) Calculate the expected revenue if both bid according to the strategy $\beta(v) = v/2$.
- (b) Explain why this not a Bayes-Nash equilibrium?
- (c) Harder bonus question: Find a Bayes-Nash equilibrium for this auction.

Q 2

Consider an auction, with reserve price X chosen from distribution G where the item is allocated to a uniformly chosen random bidder among those who bid above the reserve price. The winner pays X the reserve. Show that this auction is truthful, that is that the optimal strategy is to bid your value.

If there are two agents with independent $U[0, 1]$ values and X is also $U[0, 1]$ find the expected revenue.

Q 3

In an auction with $n \geq 3$ agents, two identical items are for sale. The two highest bidders get one item each and both pay the third highest bid. Show that this auction is truthful and find its expected revenue if the values are IID $U[0, 1]$.