### Algorithm\_week9\_lec01-20241104

说话人1 00:00  
We started this session. If we start a new topic, I would like to ask, you just completed how many midterm to midterm or three? How many? 3 3.5, which one is more? Most difficult? Four,

the 4th one is a little about the intern and I apologize for the classroom chaos. Course last week because ii forgot to put this room for the common session. It turns out there is a lecture here. Sorry about that.

说话人2 00:41  
And then I would

说话人1 00:43  
like to ask some opinion about the last question in the midterm. Question five is about the only game, right?

Now, about humanity gain. There are three questions. I think the first two are pretty easy.

The first question asks you about individual restaurant, right? Right? Basically, it asks you about three properties. One is individual right now. The second one is call. So it asks you whether certain collision structure is in the call right now. These two are somewhat standard. The last one. Still, anyone remember what's the the concept as well as next? No one will another leave and join, another call it another group, right? So it's called national state, right?

How did you answer that? Because the question asks, he's fine. One solution is not stable and justify why it is national stable. Right? What's the answer? Is it?

说话人2 02:05  
Final

说话人1 02:06  
can't find any how many agree with him? Is that two? Only two. So that means the remaining of you answer, you find somebody something. Is that what's your answer for the last question? You find some structure and show it is unstable or not. Now, this question, actually, the answer is you cannot find any, but you need to justify why. So you cannot find any. Okay, you need to say, if it wants, you need to make it as stable. Somebody has to be together, all right? And somebody else should be together. But then no matter which solution you choose, somebody will jump will move to another coalition. So the answer is cannot find any next case. Okay, congratulations for those who raise hand and I think that some of you who didn't raise hand, they also answered correctly.

Now they can now let's another thing which I would like to ask before I continue. What's the estimation about the average of the return? I don't mean the estimation of the old mark I estimation of the average, 70, 30. It's very pessimistic. Right? Now, again, it's kind of how many do you think is 40 return? 50, I don't know, 60, 6, 30. There are 15 very to the end, right? 20, not possible, right? 80. Then whats your exhibition? Again, we are just doing some polling and we will not have a break just as an estimation. Basically, the difficulty of final exam will be decided based on the midterm performance. Okay? And then tell you about this story. Not maybe I that you meet the midterm, the average mark is variable, then the final will be a bit easier. Thanks.

It's aa theory. It's a theoretical question, but everyone will try to be as good as possible, because anyway, will affect your grade right today. We are starting topic. We are going into the case study. We are trying to see how game theory can be used to solve some real problems. The first problem we talk about a is option. And also, in the last week, we already talked about acting, and today we are going to dig deeper into manage topic as well. On this site, maybe I can do one of my collaborators in very good imaging and also in natural conferences, occasion games.

Now, agenda today will be first place on basic concepts, which is just for review purpose. All right. At least that many of you still remember, some of you may have forgotten about the concepts, and then it goes to the option. And finally imagine. So basics. Now we know that game theory service scenario, we have players, and each player has some action or strategy, right? When they made some decision about which action to choose, the player will have some utility. All right? This utility is decided by a combination of players sessions. All right? Now, we just do a very simple review about for efficiency. In this example, there are three and its father, baby, and mother ok and then you see that there are four actions.

Now here it's a bit special because they have to choose one action, one same action. It's not like the scenario we talk about earlier. Agents can change their decision without affecting out of time, but here you see all three people they need to choose the same as decision, same action.

For example, they go to movie together or they go shopping together, right? This is something different. Greater efficiency means we try to find some action for this group of people such that the action is pretty often, right? And then we know that basically this one is useless thing at home. No, they only get a typical one is not good. And then this one is also not good. Movie is also not good, 2 to 2, why? Because i'm shocking. This mother will be much happier, right? So the movie also gone, right? And then you only have some two solutions or actions that one is sharpie. Yeah. The other schools, right? This baby is very happy.

Okay. Now, and efficiency, when we think about another scenario where we have $1,000, and it develops another between you and me, ok and then you can throw away some money, but usually would not do, because throwing away money will not help you with the pareto ultimate ok for example, usually you can do this, right? We made the division in arbitrary way, but the user or the $1,000, right? This is these are not very efficient, but you can also say I throw away 500, and then every one of us got 20, 200, and 50, but that's not good, because there are solutions better than this, right? Okay.

So now, in principle, actually, we do not know how to compare the city among different people. That's why we consider the concept operator of operator efficiency, because greater efficiency, we just compare 50 of the same person, right? For people, person, 81, the 50 is here or there, right? For the same, you are compared with this. But differently, usually pass ok all right? If you want to have a good solution, which achieves certain kinds of social humanity, usually political efficiency is the minimum requirement. You will ever whether enforce in a solution. If the solution is not even great, awful, maybe the solution is not good, right? It's not good. So this is just review. I think that everyone knows the definition of pareto optimal, so not waste of time on this.

Okay.

Now we talk about something new. Now, earlier, we talked about actually 1 type of players, which are the so called risk neutral player, right? What's new risk neutral player? Risk neutral player is I really care about my expected. Okay? Or my expected to be when there is uncertainty. This is something that usually happen in reality, right? Because it's easier to compute, right as well. And my expected gain is $100, then is better than expecting us $50, right? But in reality, it may not be so certain. All right. Okay. So in reality, there is another type of players, which actually is a majority of the society. This type of player is called risk averse. So risk averse is that player will prefer some outcomes. Professor more certain are instead of gamble, this probability is something more like a gamble. I have a 0 . 1, the chance. We need $1 million, but all the other cases and not do anything. Right? If this is the chance, then how does it compare with a solution that you directly get time for us? Maybe you will choose higher level. If you compute the expected utility 0 ., 1 % of 1 million is 1,000, right?

That means the expectation get $1,000, but actually, not many of you will choose that one because their chance is too small, 2 . 1 %, right? Very unlikely. You try and get everyone. I it's very unlikely, right? So in this is the first player, they will prefer getting $45 for sure over this assumption, although 45 is less than 50, right? But still 45 % in the view of the player.

Now let's come to the very famous saint petersburg paradise.

Now there is another paradox right about this newspaper, but I think that I was managed to find one on my back.

So can anyone recall what what paradox we have explained in the previous lectures? What kind of paradox? You can. It's okay not to say the name, just tell me the story of the paradox as the first question. What other paradox have been introduced in this course? Somebody know, more you get us. Good, sandra, for what is that? C you still have time to think about it, because nobody else can want to see it. Where is the lu chen? Where is that for? That's about if you both see that you and your operators did nothing operators there. Let's not talk about this dilemma. A it's a different word, right? A you can consider that a couple of us. It's okay, all right, it's called christmas dilemma, right? So which means that you expect them to do something, but actually they wouldn't do that. They will they would do something very bad, no traffic, what I mean? Bad or something. We have the plan start from.

So that's the paradox I mentioned earlier, right? You build a highway which is free of delay. And then the total delay becomes even higher after the higher. Remember, so there is a name for their paradox. I didn't say that any in the class, but that if you have time to actually they have found that name of the paradox 1.5 half bonus. All right. Ok so now today is the same illustrator bonus for the bonus opinion paradox. So what is that? That's basically about the game where you will cost a client and earn some money. So then what do you do? Basically, if you cost a client, it is scaled up. You get the loss, came up, getting us. If it's hands up, what is it? You keep tossing the .. If the second time is still up, get $4, got it. But the second time also has a you just keep tossing the coin. The third time you get up $8, $8, very good, ok $2, $4, $8. It depends on how early you see a tale up ok possible on the first time came up. You multiply the number of order by two to the power of something.

So that's the story. For example, if you toss a coin into the 10th, right? Just before the ten, then you get around the one thousand and one thousand twenty four two to the ten. So it's the first time you see it. Had a paypal, right? Intense position. You get 1,025, $24. Okay? But about the same, can you not know what's the expected gain? You see it? . This is infinity. Let's do it $2 times. What's the chance to get $2? Half times two. What was the chance to pay $4? 11 / 1 / 4, right? Because the second time you see taylor, and the first time you have 1/2 and 1/2, 1 / 4, one of the four chance to get $4 back.

One over two chance you get $8, which means one over a chance. You get $8. I'm you will do this until, in fact, no, again, you'll do it forever. So every time you compute the expected gain is one of all right? $100,000 costs dollar infringement. The expected gain of the same is infinity. Now I ask you, how much money are you going to pay? Or i'm willing to pay to china sea? Ii want you to join me by saying, say $10 you are hesitating my own infinity game, right?

$10 is not much, but you have to be such as jews, right? And then if you see a tale of the person moment you want to get that right, then it must be dollars. That's not good, right? Ok so although the expected gain is infinity, you are not willing to pay them at all. Maybe just, I want to pay $3, maybe $3, $3. All right. So that's the paragraph, right? The paralysis says, according to the expected gain, you should be willing to pay a lot of money, but actually you will not. Why will the paradise show up? The reason is I don't know they watch this game. Right? I said how much money you are willing to pay to placing us? It's only once, definitely not, you will not be able to pay much dollars, right? If I say i'd like to pay 10 times, then maybe it's okay to pay $10 each. Right? Ok so that's basically the company hands and play the game, right? Okay. So that's the philosophy reminder, right? Why you there is such a paradox.

Now, another reason that we are not willing to pay much money to join the game is that when the utility comes very high, all right? So when it is done, you may not feel as much as government. Your happiness does not feel

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that

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it's actually a lot of happiness. For example, you already have $1 million. Now for anyone you write $1 billion suspicion, I don't need to work anymore in the remaining of my life. I just buy apartments. I I can do whatever iii want to enjoy, right? It's good enough. And then suddenly I told you you can have 2 billion, would you be much happier? No, right. Feeling the same as one day.

Actually, for me, maybe 0 . 1 billion is very, very good, I know, but we didn't get 1 ~ 10 k now, you have some special right? Beyond that special, you have more money. It doesn't mean you have more patents. So this is why you will see that in reality, people for especially rich people, they are very willing to donate money to do some charity or some other things, because money to them, right? Those extra does something much. Right? But for us, it needs a lot, right? So that's the reason, right? What reason is that you're not allowed to play a lot of times? The second reason is doubling the money does not always mean doubling hands, right? So that's why we are not going to take that money. Okay. Here, we usually assume that agency city is a so called forcing media. What is palestinian means? If you win the item, you think this item is worth $100 and you pay $90, then that means your infinity is 100 - 90. It is ten, your value towards the item minus the payment. You paid the system ok so usually that will be the definition of utility.

Now you didn't wait, you could be zero, right? All right. Now let's come back to this family problem. Okay? Now remember, we have the brittle opportunity or create proficiency definition. Right? Now, suppose agents utility they are possibly in. And then we can conclude, if a status is critical, optimal, operate efficient, then its

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social

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surplus should be maximized. What social surplus, social surplus just means the overall or summation of the utility from all people.

For example, you see, here, you sum up 225, it becomes nine. If you sum up 231, it becomes 699 hundred and six. Nine is good. Six will be gone. Ok so then it's not true, because happily is happier here. But actually, money has said, if you go together with me to go shopping, I will give $1 $2, even, right? If you have $2, maybe after receiving $2, you will do it a little before ok it's okay, right? So there is speed can be right. You can pay money to them. The baby feel happy, right? And then as it becomes a critical part, right?

So anyway, when you allow money chance, then you just go for the social surplus maximization, that one must be a critical efficient one, and only that one can be pretty efficient.

And then later on, when we talk about the very famous bcg mechanism, we'll go for this interpretation. Okay? Now we come to some other handsome review. Remember that we hope that every agents they will have the so called dominant strategy, not a strategy is a matter of others do. Doing for this agent choosing the strategy will always be good for it, right? Always be best for it. Okay? And then we hope that medicine is robust against a different fact he is, right? And then all we can. At the same time, we hope that the final solution as critical issues.

So this is about the purpose of magic design. All right? Because earlier you said one amendment to the bus against various frauds. Okay. So basically, american design, it will start today, and it will persist along the remaining weeks. We'll see a lot of cases where we need to design management. Okay. So methods like this set of rules for being, for example, here in the mouse, then you say, I want this mouse to go via this exit. Now, what can you do? You say no. I I will take us. So peace goes there for all people on that direction.

This house is to you and usually not because no benefit in that direction, why the mouse along that direction, he would rather explore around. Right? So when you design rules, you cannot force the agents to do something. You can only use the so called incentives to make the agent voluntarily choose your desire direction. Okay? All right. So, okay. Yeah, so basically what you do here, so the thing you can do is to put the a piece of cheese. And then you do not need to ask about anything the muscle adjusted directly run for the cheese. Then you achieve the goal that the mouse will go via the axis right here for a feeling promise. You are facing similar situations. You're also trying to design rules so that the agents, according to their own interests for the purpose of interest maximization, they will decide to choose a strategy.

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Would you

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want to choose?

For example, telling the truth? Ok so that's the magical thing, ok of palestinian design. All right. Now, so just not to say on the hated agent, tell the truth. The second thing is probably I want to guarantee that the final decision is pretty efficient. All right? And then when it will come to remember, is not a certain kind of characters. And then when everyone tells the truth, then we hope that the final decision is paid off. And then all these things will be just satisfied automatically. Right? He said, because for the benefit of its own interest, everyone tell the truth, and then because everyone tell the truth, we that the final solution is pretty efficient, so that pretty efficiency will just be guaranteed all the time, right? By using a mechanism.

So that brings us to the discussion of option. The option we will is this about 2 types of options. One is coi function, the others on the power option. So let's look at option first. For option, we know we have two parties, one is seven, the other is five, right? Okay? What is senator giving a protocol? Right? A protocol? They can achieve the socially desirable outcome, or robust is cheap. So anyway, we have a topic of getting the social benefit at the same time. I hope that the buyers will not cheat with it. Right? Ok so this is set up. And then what is bigger? The business behavior will be affected by how you yourself decide a photo, right? Different protocols visible, but behave differently.

Now, for example, there is one very famous option method is called the descending option. What's the same price option? So you can imagine, for example, I sell something, maybe aaa boss of chalk, right? Of the boss. How much money are you going to pay? Maybe for some of you think this is worth $30, right? Some of these are just $2. But anyway, different view, you have different opinions right now in order to sell it at the highest price ever. Okay? What price do you think? I I will set? First, i'm going to increase the price. Right? Our system price, the price I should make guarantee that it is high enough that nobody is going to buy.

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All.

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Right? I said 1 million. Ii they didn't increase the price. One, I just to see whether there are somebody you think this is worth hands on the top of them. Yeah, I just keep dropping the price.

Now, when the price drops to some point, then some of you will feel nervous because if you still do not, shout. So maybe it dropped by $1 somebody else, right? Because the purpose tree increases the price. Until somebody is hand, i'm willing to buy this price. Right? So if you think this chalk is worth $30, all right? You will not risk waiting until 29, because when it reaches 29th, you may not be able to get you. Somebody else will raise their hands as well, 29, and then you have to do the draw. And then you may lose the item, right? So dropping until your ideal price, usually you will raise their hand. Okay? Afraid of losing item when it drops further, right?

Okay, so seeing that the first this kind of option will sell this item at the highest price there. Right? Ok this is also called dutch option. But today we are not talking about this option. We are talking about some other thing.

Now also will be used very useful for this domain of electro electronic commerce. So this word is very popular many years ago. And the industry. So the field is still popular nowadays, but people really use this item anymore to do academic research. But that's not sorry. Basically, this one, although in 12, this term, although it's a scientific term, it's not that high class. Right? When you see trying to commerce and there's a commerce here, right?

So basically, for it, it goes down to business. So when it's business, then it's okay, not no longer more scientific, right? But still option is in the cornerstone of this field. So lesson option. For protection purpose. Okay? Let's look at the one example of auction where you attend the auction on behalf of your friend. Okay? So there were some objects to the seven. So then for each object, your friend told you for the subject, how much money you can pay, right? For example, you can pay $100 or $50 for this item. If you pay more than that, I will give you that money. If you pay 200 items, get $200, get item, your friend will only be 1 hundred. Okay? So you definitely lose money. All right? So however, if you buy the item at the lower price, for example, your friend give you $100, you buy it at $50, then you will keep the difference. You will keep $50 at the end, right? There is some money that's utility right?

Now, if you go by, you get nothing. And then we assume that for each good, there are two players. You compete with some other person, right? Two bidders. Then they decide their own bid without knowing the opponents. Did I don't know how much will be? I have been funny to my understanding of your behavior. I don't know how how you will say it. The boss will give the goods to the one who is higher and pay the back of that bill. Now, the other one is also a so called proxy, which is the adverse also bid on behalf of the strength. Now, let's do some small tricks, because in the following several sites, there is something that is not so consistent, but no worry. I really just use an example to have some feeling. Now we assume that your opponents, the value is chosen from this range, 0 to 200, uniform distribution. Ok every family has equal probability, should know.

I have to do that. I and then what's your strategy? Now, for the third, for the first trip, suppose your friend give you $100. Now, if you pay more than 100, you lose, right? It is like. Now do that. If you did $90 away, you get $10 in your turn. Right? If you did $1 win, you get $99. I think that's what. And then how much you did. Now, basically, if you draw a curve, what does the curve tell you? The curve tells you that suppose the big price, the opponents is uniform distributed between 0 and 100 ok so you may ask me, you just show us the opponents values from 0 . 0 to 200. Why do you write through to 100?

Now, this is some trick i'm playing here, right? Let's just pretend. When your opponent said is 0 to 200, your opponent will only be 0 to 100. He will not be 200. All right? So we will know very soon why? So this case, how much do you bid? If your opponent bid in this range? They could be very low, then only chances is low, right? But your income or your utility is higher, right? So it means the higher risk, high return, right? High risk of losing, right? But if you win, you have high return. Now, on the other hand, if you figure high, you have a very high assumption, but your the net gain is small, right? That's the lowest, low return. So low risk of losing, right? Because the risk high chance winning, but then also low return.

Now, the natural value is actually here, 25, your expected bidding by bidding as a certain value can be characterized by this curve. When you get higher, you get 100, you get nothing. Right? Even if you wait, you get nothing. But if you get zero, you lose. You want to get nothing. Now, if you pick 50, then there is a hard chance to win. Because your opponents is in the range of your 100, right? You have half translate. Now basically you get $50, right? I ￡50 half is 25, but the other half is losing, right? Other half is losing, they are losing, didn't get any money. We will not get any money. That's why when you've been 50, you will get an expected money of 25. That's not as possible. So you will be 50. Right? You remember, here there is some something consistently I mentioned earlier. Here. Your friend, let me give you $100. That means your value actually is 0 to 100 ok in this range. You will just be half of it. Right? This be my happy house.

So now i'm really making stories out. So suppose your opponents also adopt the same strategy. He also because of the reality. And then from 2 to 200, he will be 10 to 1, right? Then he comes back to the assumption made earlier. We assume my opponents is from 0 to 100. That's bidding price, not the value. All right? Now, if each of us, if each of the person they paid half their, then this is actually an equivalent. And this program is the patient as equilibrium by computing the expected decision. Basically, deviation from this strategy will only give you less utility, less excited. Okay? So now you see that your only class, then you behalf and you behalf for the most behalf, now, then it becomes a nash equilibrium, right? Then they don't want to be happy. They just stick to their half strategy, right? Okay. All right. Now here, the reason that is best to do is they do not know how much value upon it is. Right? If you know that even if the distribution, you can also do better, for example, I am paid $100, but I know my fullest value is until ten, only from 0 to 10 normal distribution.

But then I want to be anything higher than ten, right? I just made it, for example, 5 hours. Right? I have a very good chance in any of us, right? Or maybe I have $10, right? Surely, no risk. So I guess it would be $10. If the maximum . of %, then I just intend it. Right? Or ten upon something, I get all the benefits ok if the opponents distribution of value, then you can do better. Okay? So now let's change a little bit. This time do not do. We still give the good to the one for this higher, but we allow them to pay the second the other way.

Now, because the earlier example, we say whoever bit higher and I and you paid a bit, so let's call first price option. The one who offers higher price will get the item, and we also pay that price. That's not good. Actually, because people cheat, just like the example I gave you earlier, if I know the other one is 0 ~ 10, my name is 100. I will not be 100. I would just be 10 . 1 and then get the item. I get a lot of money, right? So in order to make the bias truthful, they tell the truth. Then we will try this. We ask them to pay the other day. Now the other thing is actually the second highest, right? So because here we only have two people for two people. The other day is just another day. And also below it. Right? Ok if you did $10, I did 100. I believe that I think I want to take it for $10. I will not pay 1 hundred.

In this case, I will no longer cheat because cheating does not help. I imagine here's 10 to 100. You cheat in this range, no effect the price. Right? If you cheat the lower palace, you choose diagram, you should be lower. This was a big sign. And you lose diamond, but you use diamond. It sounds good for you because you can have $9 of the old system right in earlier system, which is lower. You lose diamond. No, good for you. Right?

Now this is an argument for the one who is higher price. How about 1 % here? Another lower price will be cheap. If she here don't know inside, he still didn't get out. Okay, a natural and that should be higher, I guess. And when I have this, this doesn't mean I am right, but how much does he pay to pay this price? Right? But this price is way higher than its true value, right? So that's not good. Again, item, which is worth this way and subtracting the price that item is not good. Right? So so the medical in the system, they were not cheap. All right? So this is a very famous second price option.

Now, in the second price option, usually every participant, every buyer, they will write their price, or they write them down on them. On the paper, put it in an angle, seal it and submit an angle to the seller, and that seller will collect many animals, open them and buy them. Ok and then now ok this person, higher price. This person leads to either. And this one is second, right? The first person, this price. So basically, everything has been announced by the seller.

All right, by the second and this one, we also call it the create option. Now this is the first word of these mechanism, the orange saucer data. I already analyzed. Nobody will cheat in this scenario, right? Okay. Now, one, this strategy, right? Being the true value of yourself, it is a so called dominant, the dominant strategy. No matter what others do, you give your own true parts or true? That will always be best for yourself. Remember what understood, right? So it's a dominant strategy. And also, that's why you don't need to know. The opponents say. And I have saved my effort of doing the profit, right? I because in the first price auction, the people will try to explore how much the other one will be, right? And then using their information, they can gain something. Right? If they find out of this person only level, then I would be very well to secure a very slow price.

So that is many resources will be wasted, trying to figure it out, trying to figure out other people figure. Right? That's not a very productive. But here to use the second price option, people will not need to know other people did. So they will save the resource for a smaller and a little small. So that can be very efficient, very good. Right? All right. Now, now you become independent, the real friend ok so now I want to buy something by my own, by myself. All right, my own money, then it's the same thing, right? Your own money. Then you just bid the maximum money. You are willing to pay. When I can you did that one? It will go, right? So you're cheating about that guy will not help you. Therefore, it is.

Okay, now, in motion, what's the relations? Remember, we say social surplus maximization solution is peripheral issue, right? Let's see. How do we interpret social service maximization? Now let's see that in this is now the option here. The seller, see, and the three buyers, they are going to pay $6,000, $7,000, $800. And then, according to the same price option, the one who pays higher heights, this one will get the item. And then we'll pay $7,000, right? So what's the social service here? Social service here means bias. It is + 70,

说话人2 44:51  
right?

说话人1 44:52  
What's bias is here? Bias. It is 8,000 - 7,000, because this bias six islands was 8,000, and they need to pay 7,000. He gets 1,000, right? 1,000, 1950. How about 77 as well? It just gets to $7,000. So 77,000 buyer gets 1,000. And to be 8,000, 8,000 is a social surplus maximization solution that corresponds to giving the item to the one who thinks it is most valuable. Okay? You give the one to the one who consider the item to be the most they are higher. And that was the guideline. Then the solution will respond to the social circus maximization search.

That's the interpretation option. All right, so see, that is the other seller is a 7 time at a time. Any questions here? About its performance to social service maximization or social welfare maximization? Now, this is the same price option. Now let's talk to more players. All right? They're supposed to have at least three players. Suppose we have a protocol, highest bit, highest buildings and pay the value equal to the third, highest, not second third. That is this auction protocol still good, but still can tell let the bias tell the truth if. Yes. Be the truth, right? If no, it is being a context that you want. In one example, you want scenario somebody cheat. I want to answer the question. First you care of us. I

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think if if I was the people and I know the 30 people, he has, his maximum price is very slow, and I will I will cheat.

And

说话人1 47:25  
who are you?

说话人2 47:26  
And you are

说话人1 47:27  
the first for the second, the first you are the first. What can you do?

说话人2 47:32  
I can cheat and

说话人1 47:33  
cheat me. What?

说话人2 47:35  
I cheat. I have lower, higher than 130. You

说话人1 47:42  
mean, you are this person, yeah. You cheat to be what?

说话人2 47:45  
To be

说话人1 47:46  
but you still pay 50, so you didn't get anything. Get the same thing. You get the item, you pay 50, you didn't increase your game, right?

Cheating. If it can increase the game, then people will cheat. Right? For example, if you are the first person, you are already winning, right? You are getting that you are paying 50. Even if you got higher, you still get out, you still pay you to

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you. Ok maybe I don't. Maybe I don't know whether the second one he is, the first or I am the first, maybe we are.

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But it looks. But then you've been higher, still didn't change the result. I

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know that

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not the . yet, but it's a good trial. Who do you think in the system achieve? Okay? I call rise in the search.

No, we cannot talk. You cannot prove with somebody else. You can only cheat by ourselves. The second one is she, how could she should we have AA higher risk ok the second one? She's the highest. Right? Very good. So that's fine, right? So this person in the current situation, he does not make, right? You see the zero and he cheats to be 200. Getting weights. How much do you make 50, 50, 50? His true value is 100 - 50. You get 50, 50. So there is a single person. Cheating is sometimes good. Now, in the second price option, g is not good, because if this person is higher, you need to pay 150. Then you are there. But if you only need to pay 50, why not? Right? So now cheating didn't cause a payment as high as its value. So in that case, you achieve cheating can have some benefits, right? The second person, second highest, it can achieve this scenario.

All right? Now, come to the first in class exercise. You write it down. Now, remember, when you submit the in class exercise part two, you need to write down the problem description. They do not just write the answer. Problem description is more important than answer. Okay? So what's the problem discussion today in this discussion? The question is, if I asked the first price player pay the average of third and second player. Then is this protocol truthful in this protocol or somebody cheat? Now? In my example, you see, the second person will not achieve because you need to pay average of 15 and 150,

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which is 100,

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then look at the impact ok but is it always like this? Or sometimes some place can still cheat? So remember, the price be paid. Here is the average of second and third price. Okay? I think that you have 10 minutes straight and come back to the asset.