第十一章

S4

Suppose an amusement park is being built in a city with a population of 100. Voluntary contributions are being solicited to cover the cost. Each citizen is being asked to give $100. The more people contribute, the larger the park will be and the greater the benefit to each citizen. But it is not possible to keep out the noncontributors; they get their share of this benefit anyway. Suppose that when there are n contributors in the population, where n can be any whole number between 0 and 100, the benefit to each citizen in monetary unit equivalents is n2 dollars.

(a) Suppose that initially no one is contributing. You are the mayor of the city. You would like everyone to contribute and can use persuasion on some people. What is the minimum number whom you need to persuade before everyone else will join in voluntarily?

(b) Find the Nash equilibria of the game where each citizen is deciding whether to contribute.

**Answer：**

(a)A person will voluntarily contribute if his benefit from so doing exceeds the $100 cost. Assuming that n other people are already contributing, a person’s benefit from beginning to contribute is the difference between his benefit when there are n + 1 contributors and when there are n contributors: (n + 1)2 – n2. Once there are 50 other contributors, this benefit is 512 – 502 = 101 > 100. So once the mayor convinces 50 people to contribute, the rest will join in voluntarily.

(b) There are two stable Nash equilibria in this game. When n = 0, no one is contributing, and no one wants to. When n = 100, everybody is contributing, and each person receives a private gain from so doing. (With 100 discrete individuals, there is no unstable equilibrium in the middle. When 50 other people are contributing, everybody wants to contribute; when 49 others are contributing, nobody gains from becoming contributor number 50. There is no division at which the next possible contributor isindifferent about his choice.)

**U2**

A class with 30 students enrolled is given a homework assignment with five questions. The first four are the usual kinds of problems, totalling to 90 points. But the fifth is an interactive game for the class. The question reads: You can choose whether to answer this question. If you choose to do so, you merely write I hereby answer Question 5.If you choose not to answer Question 5, your score for the assignment will be based on your performance on the first four problems. If you choose to answer Question 5, then your scoring will be as follows: If fewer than half of the students in the class answer Question 5, you get 10 points for Question 5; i.e. 10 points will be added to your score on the other four questions to get your total score for the assignment. If half or more than half of the students in the class answer Question 5, you get 10 points; i.e. 10 points will be subtracted from your score on the other questions.What would you expect to see happen in this game if it were actually played in a college classroom? Why? Consider two cases: (i) the students make their choices individually with no communication; and (ii) the students make their choices individually but can discuss thesechoices ahead of time in a discussion forum available on the class Web site.SOLUTION I truly believe that if this game was actually played in a college classroom I would expect many students to really just answer the question. This is because most of the times, college students like shortcuts and rarely read the instructions given keenly. The question just needs asimple statement and it is very tempting to everyone. Moreover, there is a likelihood that many will just read the first part where marks are being added and take less keen to the second part where deduction is done. If the students make their choices individually with no communication there will be a division between informed/ clever students and less informed students. The informed studentswill hardly attempt to gamble with deduction of marks and so very few will attempt to answerthe question. This is because they are likely to be satisfied with the four questions done. On the other hand, the less informed students are likely to put their fate on luck and will tend to attempt the question with the wish that a miracle can happen and that fewer people may answer so that they can get the additional marks.

Need the answer?

**Answer：**

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If the students make their choices individually but can discuss these choices ahead of time in a discussion forum available on the class Web site, there is a high likely hood of two scenarios. First, if the discussion showed that many are willing to answer the question then it will be surprising that many will tend to answer the question. This is because when individually choosing the question everyone will tend assume that their colleagues will not attempt to answer the question since the statistics during the discussion showed that many will answer the question. Therefore many students will tend to answer the question hoping that their colleagues did not attempt and therefore many will answer the question. On the other hand, if the discussion showed that very few are willing to answer the question it will also be surprising to know that very few will answer the question. This is because the students will assume that everyone will change their mind during the selection and choose to answer the question since the statistics showed that very few are willing to answer. They will assume hat their colleagues were bluffing during the discussion and therefore many of them will not risk answering the question and hence very few will really answer the question.