

## Recuperação Paralela de Inglês – 3ª série EM – 1º Bimestre

### TESTES

Texto para os testes de 1 a 4.

For centuries, mathematicians have searched for a perfect voting system. Finally, in 1952, economist Kenneth Arrow proved that finding an absolutely fair and decisive voting system is impossible. Kenneth Arrow is the Joan Kenney Professor of Economics, as well as professor of operations research at Stanford University. In 1972, Arrow received the Nobel Prize in Economic Science for his outstanding work in the theory of general economic equilibrium. His numerous other honors include the 1986 von Neumann Theory Prize for his fundamental contributions to the decision sciences.

He has served as president of the American Economic Association, the Institute of Management Sciences, and other organizations.

Dr. Arrow talks about the process by which he developed his famous impossibility theorem and his ideas on the laws that govern voting systems:

My first interest was in the theory of corporations. In a firm with many owners, how do the owners agree when they have different opinions, for example, about the prospects of the company? I was thinking of stockholders. In the course of this, I realized that there was a paradox involved – that majority voting can lead to cycles. I then dropped that discussion because I was frustrated by it.

I happened to be working with the RAND Corporation one summer about a year or two later. They were very interested in applying concepts of rationality, particularly of game theory, to military and diplomatic affairs. That summer, I felt not like an economist but instead like a general social scientist or a mathematically oriented social scientist. There was tremendous interest in game theory, which was then new.

Someone there asked me, "What does it mean in terms of national interest?" I said, "Oh, that's a very simple matter," and he said, "Well, why don't you write us a little memorandum on the subject." Trying to write that memorandum led to a sharper formulation of the social-choice question, and I realized that I had been thinking of it earlier in that other context.

I think that society must choose among a number of alternative policies. These policies may be thought of as quite comprehensive, covering a number of aspects: foreign policy, budgetary policy, or whatever. Now,

each individual member of the society has a preference, or a set of preferences, over these alternatives. I guess that you can say one alternative is better than another. And these individual preferences have a property I call rationality or consistency, or more specifically, what is technically known as transitivity: if I prefer a to b, and b to c, then I prefer a to c.

Imagine that society has to make these choices among a set. Each individual has a preference ordering, a ranking of these alternatives. But we really want society, in some sense, to give a ranking of these alternatives. Well, you can always produce a ranking, but you would like it to have some properties. One is that, of course, it be responsive in some sense to the individual rankings. Another is that when you finish, you end up with a real ranking, that is, something that satisfies these consistency, or transitivity, properties.

And a third condition is that when choosing between a number of alternatives, all I should take into account are the preferences of the individuals among those alternatives. If certain things are possible and some are impossible, I shouldn't ask individuals whether they care about the impossible alternatives, only the possible ones. It turns out that if you impose the conditions I just stated, there is no method of putting together the individual preferences that satisfies all of them.

(For All Practical Purposes: Introduction to Contemporary Mathematics. W. H. Freeman and Company, New York, 1988, p. 181-2.)

1. In his theorem, Arrow proved that:
  - a) transitivity is an incorrect principle.
  - b) game theory is an unproven tool for decision making purposes.
  - c) company owners generally disagree on the company's prospects.
  - d) majority voting does not lead to definite choices.
  - e) game theory is a simple issue, in terms of national interest.
2. The impossibility theorem effectively says that:
  - a) the ranking of alternatives on the basis of all reasonable conditions is not feasible.
  - b) individuals should not rank impossible alternatives.

- c) transitivity is the paramount condition underlying any type of ranking.
- d) transitivity conflicts with consistency.
- e) there are not enough reasonable conditions to be taken into account when society wishes to rank decision alternatives.

3. Arrow's conclusion was that:

- a) majority voting is responsible for the occurrence of business cycles.
- b) individual preferences are not consistent.
- c) there is no satisfactory way of going from individual preferences to social choice.
- d) decision-making by society on the basis of individual preferences is always possible.
- e) it is impossible to apply game theory to diplomatic decision-making.

4. When describing his work, Arrow says that his results are:

- a) irrelevant to the nation's interest.
- b) applicable to all social choice situations.
- c) inconsistent with the results of game theory.
- d) outside the realm of economics, since there is always cyclical behavior.
- e) inconsistent with individual preferences, because they may not be transitive.

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Observe as figuras.

I



II



5. No que reside a ironia do primeiro cartum?

6. O humor do segundo cartum deriva de uma contradição. Que contradição é essa?

Texto para a questões 7 e 8.

### Laughter is the Best Medicine

Humor is infectious.

The sound of roaring laughter is far more contagious than any cough, sigh, or sneeze. When laughter is shared, it binds people together and increases happiness and intimacy. In addition to the domino effect of joy and musement, laughter also triggers healthy physical changes in the body. Humor and laughter strengthen your immune system, boost your energy, diminish pain, and protect you from the damaging effects of stress. Best of all, this priceless medicine is fun, free, and easy to use.

7. O texto considera o riso mais contagioso do que outras manifestações físicas. Indique duas dessas outras manifestações.

8. Explique os efeitos positivos do bom humor e do riso para a saúde física das pessoas.