Answers and Explanations

Introduction

The anti-selfishness principle rejects actions by the subject that cause damage to the group or to society in cases when the subject is pursuing his personal goals. Thus, the pattern

advantageous for the subject – disadvantageous for the society

contradicts the anti-selfishness principle, while the patterns

advantageous for the subject – advantageous for the society,
disadvantageous for the subject – advantageous for the society,
disadvantageous for the subject – disadvantageous for the society,

do not contradict the principle.

1. Herostratus' actions follow the pattern "advantageous for the subject – disadvantageous for the society"; therefore, he does not behave in accord with the anti-selfishness principle.

2. The action of a rich man who leaves his fortune to the church in hopes to get to heaven follows the pattern "advantageous for the subject – advantageous for the society," which does not contradict the anti-selfishness principle.

3. The father's actions follow the pattern "advantageous for the subject – disadvantageous for the society." They contradict the principle.

4. The king's actions follow the pattern "disadvantageous for the subject – disadvantageous for the society." His actions do not contradict the anti-selfishness principle.

5. Danko's act personifies the pattern "disadvantageous for the subject – advantageous for the society" that corresponds to the anti-selfishness principle.

6. By organizing circuses, the ruler acts by the pattern "advantageous for the subject – advantageous for the society," which does not contradict the anti-selfishness principle.

7. The emperor acts on the pattern "advantageous for the subject – disadvantageous for the society," which contradicts the anti-selfishness principle. He saves a human life, acting as preferred by the self, but against the people's wishes.

8. Saving the human life and explaining the motives for his action, the emperor changes the preferences of the society. So, his action falls under the pattern "advantageous for the subject – advantageous for the society," i.e., it does not contradict the anti-selfishness principle.

Chapter 1

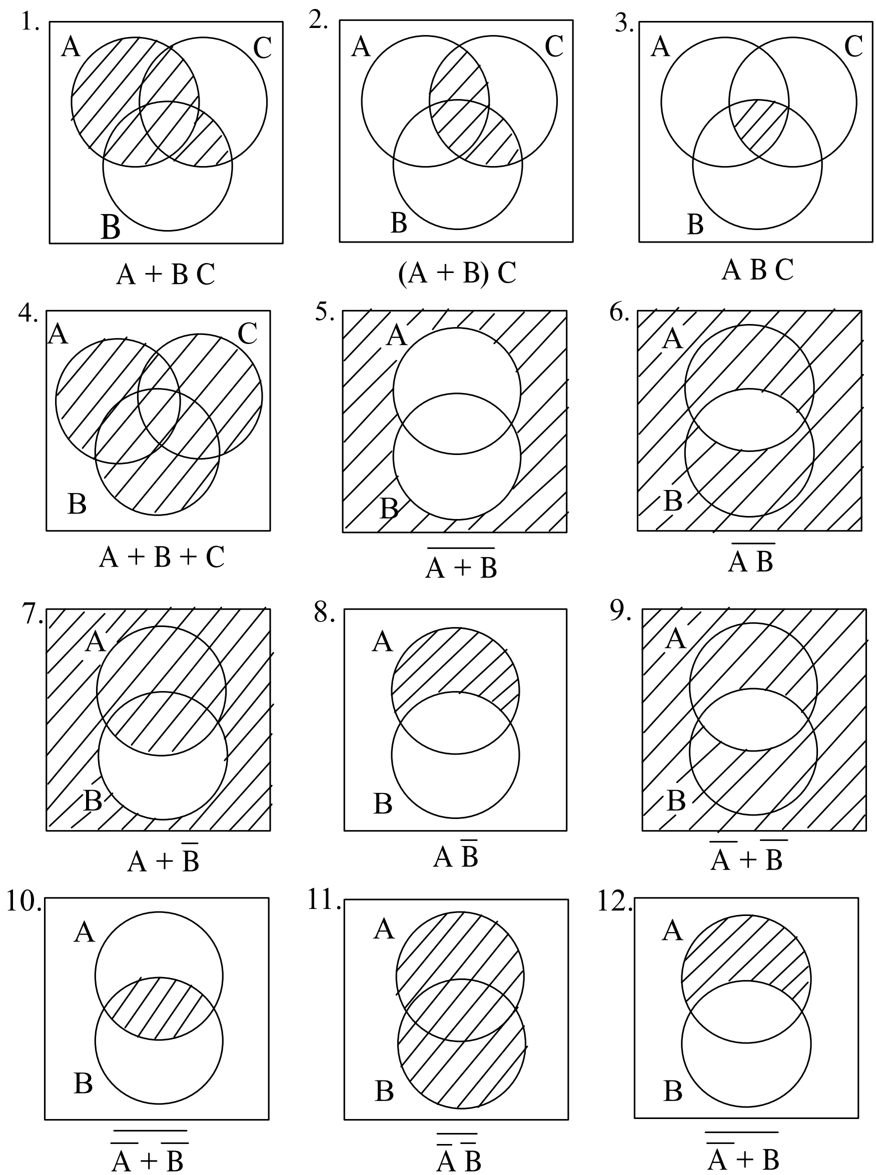

Fig. A2-1. Answers to problems 1-12

13. $(a + b) \supseteq x \supseteq b$

14. no solution

15. $1 \supseteq x \supseteq (a + b)$

16. $1 \supseteq x \supseteq b$

17. solution only at $c = 1$: $x = 1$

18. $\{\alpha, \beta\} \supseteq x \supseteq \{\alpha\}$

19. no solution

20. $x = \{\alpha\}$

21. the equation can be reduced to $x = \{\beta, \gamma\}x + (\alpha, \beta\}\bar{x}$; the inequality $\{\beta, \gamma\} \supseteq \{\alpha, \beta\}$ does not hold, since the right set is not a subset of the left set; therefore, the equation has no solution

22. $x = \{\beta, \gamma\}$

23. $1 \supseteq x \supseteq \{\alpha, \beta\}$

24. no solution

25. $a + \bar{b}c$

26. $a + b + \bar{c}d$

27. $a + \bar{b}\bar{c} + d + \bar{e}$

28. $a + \bar{b}(c + d)$

29. $a + \bar{b}c$

30. a

31. 1

32. a

33. a

34. $a + \bar{b}$

35. solution only at $a = 1$: $x = 1$

36. $x = 1$

37. $1 \supseteq x \supseteq 0$

38. solution exists only if $a + b = 1$: $x = 1$

39. solution exists only if $a + b = 1$: $x = 1$

40. $x = 1$

41. $(a + \bar{b}) \supseteq x \supseteq a$

42. solution exists only if $c \supseteq \bar{a}\bar{b}$: $x = a + b$

43. solution exists only if $a + \bar{b} = 1$: $x = 1$

44. $1 \supseteq x \supseteq (a + \bar{b})$

45. $1 \supseteq x \supseteq 0$

46. $1 \supseteq x \supseteq \bar{a}b$

47. $1 \supseteq x \supseteq \{\gamma\}$

48. $1 \supseteq x \supseteq \{\alpha, \beta\}$

49. $x = \{\alpha, \beta\}$

50. $x = \{\alpha, \gamma)$

Chapter 2

1. $<a>\ R\ <b, c, d>$
2. $<a>\ R\ <b>$
3. $<a, c, e>\ \overline{R}\ <b, d, f>$
4. $<a>\ R\ <b, c>$
5. $<a, b, c, d>\ R\ <e>\ R\ <f>$
6. not $S_{(4)}$
7. $S_{(4)}$
8. not $S_{(4)}$
9. not $S_{(4)}$
10. $S_{(4)}$
11. $S_{(4)}$
12. $S_{(4)}$
13. $S_{(4)}$
14. not $S_{(4)}$
15. $S_{(4)}$
16. 5 subsets $S_{(4)}$
17. no $S_{(4)}$
18. 1 subset $S_{(4)}$
19. 2 subsets $S_{(4)}$
20. 1 subset $S_{(4)}$

Chapter 3

1. decomposable
2. not decomposable
3. decomposable
4. not decomposable
5. decomposable
6. $(a + b)(c + d + e)$
7. $b(a + c) + d(e + f)$
8. $a + b + c + de$
9. $ad + bc$
10. $a + (b + d)(c + e)$

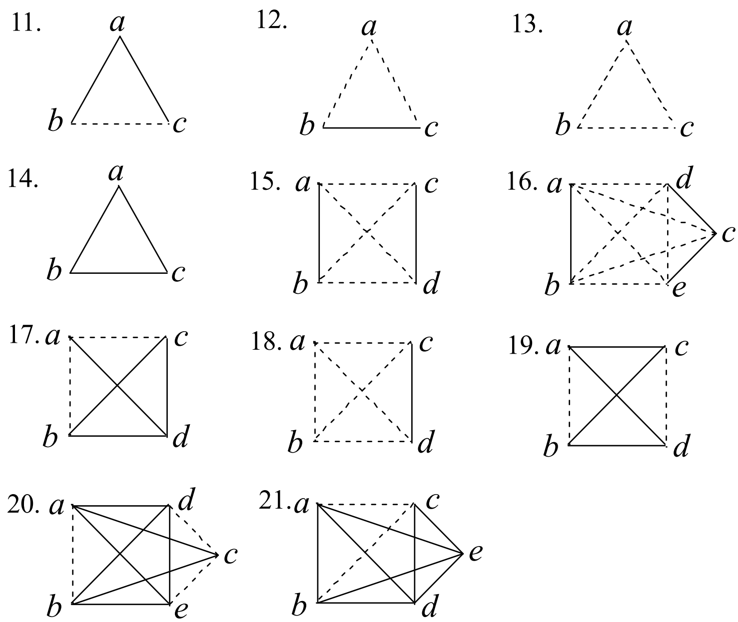

Fig. A2-2. Answers to problems 11-21

22.

$[a] + [b] + [c]$

$[a + b + c]$

23.

$[b]\ [c]$

$[a] + [bc]$

$[a + bc]$

24.

$[a] + [b]$ $\quad$ $[c] + [d]$

$[a + b]$ $\quad$ $[c + d]$

$[(a + b)(c + d)]$

$[b] + [c]$

$[a]\ [\mathrm{b} + c]$

25. $[a\ (b + c)]$

$[b] + [c]$

$[a]\ [b + c]$

$[d] + [a\ (b + c)]$

26. $[d + a(b + c)]$

$[d] + [e]$

$[a]\ [b]\ [c]\ [d + e]$

27. $[abc\ (d + e)]$

$[b] + [c]$

$[a]\ [b + c]$ $\qquad$ $[d]\ [e]$

$[a\ (b + c)]$ $\qquad$ $+ [de]$

28. $[a\ (b + c) + de]$

$[a]\ [b]$ $\qquad$ $[c]\ [d]$

$[ab]$ $\qquad$ $+ [cd]$

$[ab + cd]$ $\qquad$ $[e]$

29. $[(ab + cd)\ e]$

$[c] + [d]$

$[a]\ [b]\ [c + d]$

30. $[ab\ (c + d)]$

$[b]\ [c]$ $\qquad$ $[d]\ [e]\ [f]$

$[a] + [bc]$ $\qquad$ $+ [def]$

31. $[a + bc + def]$

$[e] + [f]$

$[d]\ [e + f]$

$[c] + [d\ (e + f)]$

$[b]\ [\mathrm{c} + d\ (e + f)]$

$[a] + [b\ (c + d\ (e + f)]$

32. $[a + b\ (c + d\ (e + f))]$

[e] [f]

[d] + [ef]

[b] [c] [(d + ef)]

[a] + [bc (d + ef)]

33. [a + bc (d + ef)]

[e] [f]

[a] + [b] + [c]   [d] + [ef]

[a + b + c]   [d + ef]   [g]

34. [(a + b + c) (d + ef) g]

[a] [b]   [c] [d]   [e] [h]   [f] [g]

[ab] + [cd]   [eh] + [fg]

[ab + cd]   [eh + fg]

35. [(ab + cd) (eh + fg)]

[e] [f]

[g] + [ef]

[a] [b] [c]   [d] [g + ef]

[abc] + [d(g + ef)]

36. [abc + d (g + ef)]

Chapter 4

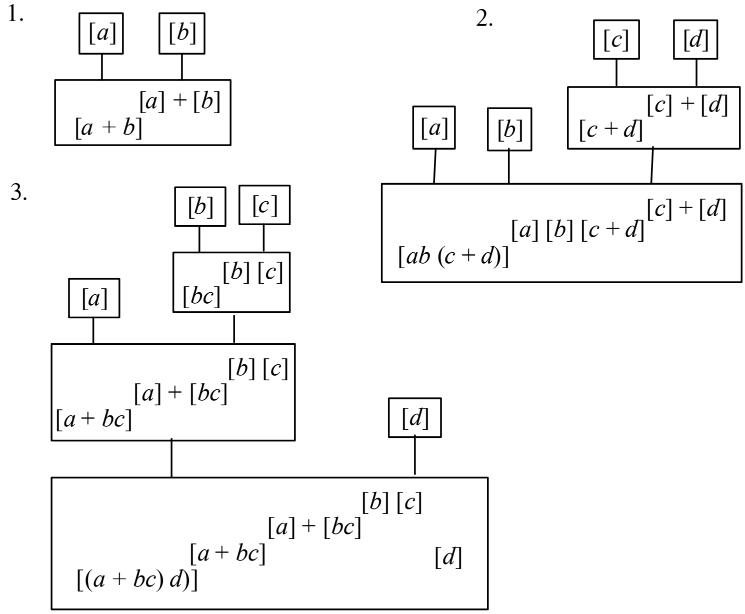

Fig. A2-3. Answers to problems 1-3

4. $a + bc$ 5. $\bar{a} + b + c$ 6. 1

7. $a + b$ 8. $(b + cd) \supseteq a \supseteq cd$

9. solution exists only if $b + c + d + e = 1$: $a = 1$

10. $a = 1$

11. Subject a is in frustration; $b : 1 \supseteq b \supseteq \{\alpha, \gamma, \delta\}$; $c : c = 1$;

$d : 1 \supseteq d \supseteq \{\beta\}$

12. $W = \{\alpha, \beta, \gamma\}$ 13. $P = \{\alpha, \beta, \gamma\}$ 14. $\overline{P}W = \{\}$

15. $R = 0$, i.e., the set of actions always chosen is empty; $S = \{\gamma\}$

16. $R = \{\alpha, \beta\}$, $S = 0$, i.e., the set of actions never chosen is empty

17. $R = 0$, $S = 0$; both sets are empty, i.e., there are no actions always chosen, nor are there actions never chosen.

18. $R = 0$, no actions always chosen; $S = 1$, all actions are never chosen.

Chapter 5

1. Subject b is in the active state (b = 1).

2. Subjects a and b are in the active state, c is in a state of frustration, and d and e are in the state of free choice.

3. They can.

For example, consider the following table:

Table A2-1. Matrix of influences for problem 3

	a	b	c	d	e
a	a	0	0	0	0
b	0	b	0	0	0
c	0	0	c	0	0
d	0	0	0	d	1
e	1	1	1	1	e

With these influences, all solutions to equation (5.1.2) are equal to 1.

4. They cannot.

To prove this, it is enough to analyze one subject e. He corresponds to the equation

$$e = Ae + B\overline{e},$$

where $A = 1$ and $B = d + \overline{c}(\overline{a} + \overline{b})$. Solutions of this equation belong to the interval

$$1 \supseteq e \supseteq B,$$

where B either 1 or 0. In the first case, subject e will be in the active state, and in the second case, in a state of free choice. Thus, no matter what the influences are, the subject will not be in the passive state.

5. They cannot.

The state of frustration appears when in the subject's equation of choice, relation $A \supseteq B$, does not hold. When solving the previous problem for subject *e*, we found that $A \supseteq B$ regardless of influences. Therefore, *e* cannot be in a state of frustration.

6. They cannot.

The state of free choice appears if the equation's solutions belong to the interval $1 \supseteq x \supseteq 0$, that is, the relation $A \supset B$ must hold. Consider the equation for subject *c*:

$$c = Ac + B\overline{c} \quad ,$$

where $A = e + d$ and $B = e + d + \overline{a} + \overline{b}$. We see that $A \subseteq B$. Thus, subject *c* cannot be in a state of free choice.

7. The graph corresponds to the polynomial

$$ab\ (c + d),$$

the diagonal form

$$\begin{array}{lll} & & [c] + [d] \\ & [a]\,[b]\,[c + d] & \\ [ab\ (c + d)] & & \end{array}$$

and the equations

$$a = c + d + \overline{a} + \overline{b}$$
$$b = c + d + \overline{a} + \overline{b}$$
$$c = c + d + \overline{a} + \overline{b}$$
$$d = c + d + \overline{a} + \overline{b}$$

The following matrix moves subjects to the indicated states:

Table A2-2. Matrix of influences for problem 7

	a	*b*	*c*	*d*
a	*a*	1	1	1
b	1	*b*	1	1
c	0	0	*c*	0
d	0	0	0	*d*

8. It is possible.

For example, by changing the relation between *c* and *d* from conflict to cooperation.

Chapter 6

1. The choice is possible only if $b + c = 1$: $a = 1$.

The relations graph is not decomposable. After the removal of subjects f and e, the graph remains not decomposable. The removal of subject d makes it a decomposable graph:

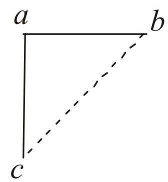

Fig. A2-4. Graph of relations for problem 1

This graph corresponds to the polynomial

$$a(b + c),$$

and the diagonal form

$$\begin{array}{rl} & [b] + [c] \\ & [a]\,[b + c] \\ [a(b + c)] & \end{array}$$

and the equation for a is

$$a = (b + c)\,a + \bar{a}\,,$$

which leads to the conclusion that choice is possible only at $b + c = 1$. So, $a = 1$.

2. $a = 1$.

3. $(b + d) \supseteq a \supseteq d$

4. $1 \supseteq a \supseteq (d + \bar{e} + \bar{f} + \bar{c})$

5. The graph corresponds to the diagonal form

$$\begin{array}{lcl} & [a]\,[b]\,[c] & \\ [abc] & & \equiv 1, \end{array}$$

thus, every subject chooses alternative 1. The meaning of 1, however, is different for each subject:

for a, $1 = \{\alpha\}$
for b, $1 = \{\beta, \gamma\}$
for c, $1 = \{\delta, \eta, \theta\}$

6. After choosing 1, subject a can realize alternative $\{\alpha\}$; subject b either $\{b\}$ or $\{\gamma\}$; subject c can realize any of the alternatives $\{\delta\}$, $\{\eta\}$, $\{\theta\}$, $\{\delta, \theta\}$, $\{\eta, \theta\}$.

Chapter 7

1. Cooperation
2. Conflict
3. Conflict
4. Conflict
5. Cooperation
6. Cooperation
7. Conflict
8. Cooperation
9. Conflict
10. Cooperation

Chapter 8

1. No, it is not.

The group corresponds to the polynomial

$$g\,(d + c) + fe$$

and the diagonal form

$$\begin{array}{lllll}
 & & [d] + [c] & & \\
 & [g]\,[d + c] & & [f]\,[e] & \\
 [g\,(d + c)] & & + [fe] & & \\
 [g\,(d + c) + fe] & & & &
\end{array}$$

This form is equivalent to the initial polynomial, which is equal to 0 at $g = 0$ and $f = 0$.

2. Yes, it will.

To obtain the polynomial describing the group after peacemaker a joins it, we have to multiply a by the polynomial describing the group before the arrival of the peacemaker:

$$a\,(g\,(d + c) + fe).$$

This polynomial corresponds to the diagonal form

$$\begin{array}{llllll}
 & & & [d] + [c] & & \\
 & & [g]\,[d + c] & & [f]\,[e] & \\
 & [g\,(d + c)] & & + [fe] & & \\
 [a\,]\,[g\,(d + c) + fe)] & & & & & \\
 [a\,(g\,(d + c) + fe)] & & & & & \equiv 1.
\end{array}$$

3. It will be superactive.

After two cooperating peacemakers join the group, the group corresponds to the polynomial

$$ab\,(g\,(d + c) + fe)$$

and the diagonal form

$$\begin{array}{l}
\hspace{24em}[d] + [c] \\
\hspace{20em}[g]\,[d + c] \hspace{5em} [f]\,[e] \\
\hspace{16em}[g\,(d + c)] \hspace{6em} + [fe] \\
\hspace{7em}[a\,]\,[b]\,[g\,(d + c) + fe)] \\
[ab\,(g\,(d + c) + fe)] \hspace{14em} \equiv 1.
\end{array}$$

4. No, it will not.

After two conflicting peacemakers join the group, the polynomial becomes

$$(a + b)\,(g\,(d + c) + fe)$$

and the diagonal form

$$\begin{array}{l}
\hspace{25em}[d] + [c] \\
\hspace{22em}[g]\,[d + c] \hspace{3em} [f]\,[e] \\
\hspace{10em}[a] + [b] \hspace{5em} [g\,(d + c)] \hspace{4em} + [fe] \\
\hspace{8em}[a + b] \hspace{3em} [g\,(d + c) + fe] \\
[(a + b)\,(g\,(d + c) + fe)] \hspace{16em} ,
\end{array}$$

which is equivalent to

$$a + b + (\bar{g} + \bar{d}\bar{c})(\bar{f} + \bar{e})\,.$$

At $a = 0$, $b = 0$, $f = 1$ and $e = 1$ this expression is equal to 0.

5. The group is not superactive.

Its polynomial is

$$(d + e)\,(c + f)$$

and its diagonal form is

$$\begin{array}{llll} & & [d] + [e] & [c] + [f] \\ & [d + e] & & [c + f] \\ [(d + e)\,(c + f)] & & & , \end{array}$$

which is equivalent to the initial polynomial equal to zero when $d = 0$ and $e = 0$.

6. The group will not be superactive.

After subject a joins the group, its polynomial becomes

$$a\,(d + e)\,(c + f)$$

and its diagonal form is

$$\begin{array}{llll} & & [d] + [e] & [c] + [f] \\ & [a]\,[d + e] & & [c + f] \\ [a(d + e)\,(c + f)] & & & , \end{array}$$

which is equivalent to

$$(d + e)\,(c + f) + \overline{a}\,.$$

This expression is equal to zero at $a = 1$, $d = 0$, $e = 0$.

7. It will.

The group corresponds to the polynomial

$$a + (d + e)\,(c + f)$$

and the diagonal form

$$\begin{array}{lllll} & & & [d] + [e] & [c] + [f] \\ & & [d + e] & & [c + f] \\ & [a] + [(d + e)\,(c + f)] & & & \\ [a + (d + e)\,(c + f)] & & & & \equiv 1. \end{array}$$

Chapter 9

1. Yes, it can.

The graph corresponds to the polynomial

$$(a + d)\,(c + b),$$

and the diagonal form

$$\begin{array}{lll} & & [a] + [d] \qquad [c] + [b] \\ & [a + d] & \qquad [c + b)] \\ [(a + d)\,(c + b)] & & \end{array}$$

and the equation for b is

$$b = (a + d)\,(c + b).$$

When $c = 1$, subject a with influence $a = 1$ makes subject b choose alternative 1.

2. Cannot	3. Cannot	4. Cannot	5. Can
6. Cannot	7. Can	8. Can	9. Can

The equation for b is

$$b = a\,(b + c) + \overline{a}\ .$$

To make b to choose 1, a must exert influence 0.

10. Cannot.

The graph corresponds to the polynomial

$$a + b + cd,$$

and the diagonal form

$$\begin{array}{lll} & & [c]\,[d] \\ & [a] + [b] + [cd] & \\ [a + b + cd] & & \end{array}$$

and the equation for b is

$$b = a + b + cd\ .$$

When $c = 1$ and $d = 1$, subject b chooses 1, independently of a's influence.

11. Can. 12. Can. 13. Can. 14. Can.

The graph corresponds to the polynomial

$$ab(c + d),$$

and the diagonal form

$$\begin{array}{lll} & & [c] + [d] \\ & [a]\,[b]\,[c + d] & \\ [ab(c + d)] & & , \end{array}$$

and the equation for b is

$$b = c + d + \overline{a} + \overline{b}\ .$$

When $c = 0$ and $d = 0$, a must exert influence $a = 1$, so that b becomes incapable of making a choice.

15. Cannot. 16. Cannot. 17. Cannot. 18. He will.

After the relation (a, b) has changed, the graph corresponds to the polynomial

$$ac + bd,$$

and the diagonal form

$$\begin{array}{llll} & & [a]\,[c] & [b]\,[d] \\ & [ac] & + [bd] & \\ [ac + bd] & & & \end{array}$$

and the equation for b is

$$b = ac + bd.$$

Subject b has a chance to obtain freedom of choice. This will happen when $c = 0$ and $d = 1$.

19. He will.

20. Will not.

After subject e is removed, the graph remains not decomposable, and the next one to be removed is subject a.

21. Will not.

22. Will remain.

Chapter 10

1. The son cannot make a choice.

He corresponds to the polynomial

$$a\ (b + c + d),$$

and to the diagonal form

$$\begin{array}{lll} & & [b] + [c] + [d] \\ & [a]\ [b + c + d] & \\ [a\ (b + c + d)] & & , \end{array}$$

and the equation is

$$a = (b + c + d)a + \overline{a}\ .$$

The condition for this equation to have a solution is $b + c + d = \{\alpha, \beta, \gamma\} = 1$. In the given case, $b + c + d = \{\alpha\} \subset 1$; thus, choice is impossible.

2. $b = (\alpha, \beta, \gamma\} = 1$

3. The son will be in a state of frustration.

4. Bob (a_3): $1 \supseteq a_3 \supseteq \{\alpha_3,\ \alpha_4\}$

   Peter (a_4): $1 \supseteq a_4 \supseteq \{\alpha_3,\ \alpha_4\}$

   Larry (a_5): cannot make a choice

After John and Tom are moved to another cell, the graph of relations becomes

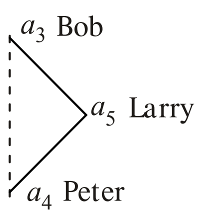

Fig. A2-5. Graph of relations for problem 4

The graph corresponds to the polynomial

$$a_5\ (a_3 + a_4),$$

the diagonal form

$$[a_3] + [a_4]$$

$$[a_5]\ [a_3 + a_4]$$

$$[a_5\ (a_3 + a_4)]$$

and the equations

$$a_3 = a_5(a_3 + a_4) + \overline{a}_5$$

$$a_4 = a_5(a_3 + a_4) + \overline{a}_5$$

$$a_5 = a_5(a_3 + a_4) + \overline{a}_5$$

The matrix of influences is

Table A2-3. Matrix of influences for problem 4

	a_3	a_4	a_5
a_3	a_3	$\{\alpha_3\}$	$\{\alpha_3\}$
a_4	$\{\alpha_4\}$	a_4	$\{\alpha_4\}$
a_5	$\{\alpha_5\}$	$\{\alpha_5\}$	a_5

By solving the equations with the variables' values given in the matrix, we obtain the choices indicated above.

5. John chooses alternative 1.

After Tom is sent to the prison hospital, the graph becomes

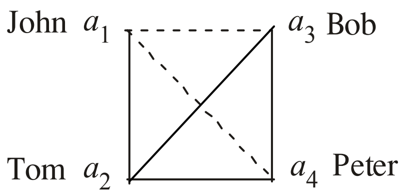

Fig. A2-6. Relations graph for problem 5

The graph corresponds to the polynomial

$$a_2(a_1 + a_3\ a_4\ )$$

and the diagonal form

$$[a_3]\ [a_4]$$
$$[a_1] + [a_3\ a_4]$$
$$[a_2]\ [a_1 + a_3\ a_4]$$
$$[a_2(a_1 + a_3\ a_4)] \qquad \equiv 1.$$

Thus, John chooses $\{\alpha_2,\ \alpha_3,\ \alpha_4\} = 1$. This choice can be interpreted as John's conclusion that the cigarette was not lost but stolen by someone in the cell.

6. Edward cannot make a decision; he is in a state of frustration.

After Gregory's removal, the graph remains not decomposable. In accord with his order of significance, Edward removes David from consideration and the graph becomes

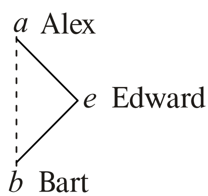

Fig. A2-7. Relations graph for problem 6

It corresponds to the polynomial

$$e\ (a + b),$$

and the diagonal form

$$\begin{array}{r}[a] + [b] \\ [e]\ [a + b] \\ [e\ (a + b)]\end{array}$$

and the equation for Edward is

$$e = (a + b)e + \overline{e}\ ,$$

$a = \{\delta\}$, $b = \{\delta\}$, so $(a + b) \subset 1$. The equation has no solution.

Chapter 11

1. The choice of the political elite belongs to interval $1 \subseteq a \subseteq \{\beta\}$, i.e., it chooses one of two alternatives: $1 = \{\alpha, \beta\}$, $\{\beta\}$. Choosing 1 is interpreted as the decision not to be inactive but choose some economic policy, choosing $\{\beta\}$ as the decision to have a market economy. The situation corresponds to the graph

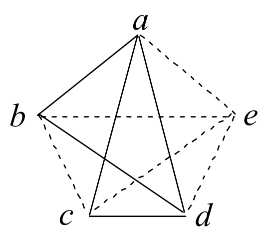

Fig. A2-8. Graph of relations to problem 1

the polynomial

$$e + ad\,(b + c),$$

and the diagonal form

$$\begin{array}{llll} & & & [b] + [c] \\ & & [a]\,[d]\,[b + c] & \\ & [e] + [ad\,(b + c)] & & \\ [e + ad\,(b + c)] & & & \end{array}$$

and the equation for a is

$$a = (d + e)a + e\bar{a}\ .$$

Note that, in this case, the choice of the political elite depends on the positions of the population(d) and of business (e): $d = \{\alpha\}$, $e = \{\beta\}$. With these values

$$1 \supseteq a \supseteq \{\beta\}\ .$$

2. $a = 1$. The elite will not be inactive.
Here is the graph of the situation:

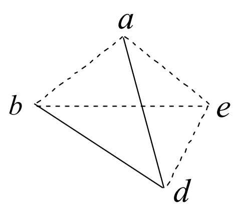

Fig. A2-9. Graph of relations for problem 2

the polynomial

$$e + d\,(a + b),$$

the diagonal form

$$\begin{array}{llll} & & & [a] + [b] \\ & & [d]\,[a + b] & \\ & [e] + [d\,(a + b)] & & \\ [e + d\,(a + b)] & & & \end{array}$$

and the equation for a

$$a = e + d\ .$$

In this case, the choice of the political elite does not depend on military influence. For $d = \{\alpha\}$,
$e = \{\beta\}$

$$a = 1\ .$$

The political elite chooses an active line of behavior and will decide for itself what economic course to take.

3. The military will make the decision that business dictates.
The equation for the military is

$$b = e + d\,(b + ac),$$

which differs from (11.1.3) only by the variable b on the left side.

Since $d = 0$,

$$b = e\ .$$

4. The president has freedom of choice.
The following graph corresponds to the situation:

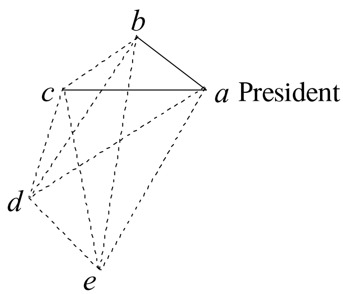

Fig. A2-10. Graph of relations for problem 4

the polynomial

$$d + e + a\,(b + c),$$

the diagonal form

$$[b] + [c]$$
$$[a]\,[b + c]$$
$$[d] + [e] + [a\,(b + c)]$$
$$[d + e + a\,(b + c)]$$

and the equation for a

$$a = a + d + e.$$

We substitute the values of influences $d = 0$, $e = 0$ and obtain:

$$a = a.$$

5. The president chooses candidate α.
The situation corresponds to the graph

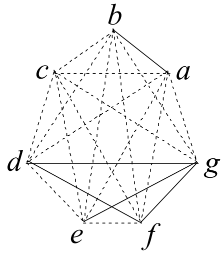

Fig. A2-11. Graph of relations for problem 5

the polynomial

$$ab + c + g\,(e + df),$$

and the diagonal form

$[d]\,[f]$

$[e] + [df]$

$[a]\,[b]$ $\quad$ $[g]\,[e + df]$

$[ab]$ $\quad$ $+ [c] + [g\,(e + df)]$

$[ab + c + g\,(e + df)]$

and the equation for a is

$$a = ab + c + g\,(e + df).$$

After substitution we find

$$a = \{\alpha\}.$$

6. Party g is in a state of free choice.

The situation corresponds to the graph

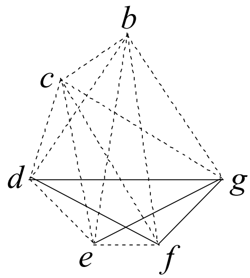

Fig. A2-12. Graph of relations for problem 6

the polynomial

$$b + c + g\ (e + df),$$

and the diagonal form

$$
\begin{array}{r}
[d]\ [f] \\
[e] + [df] \\
[g]\ [e + df] \\
[b] + [c] + [g\ (e + df)] \\
[b + c + g\ (e + df)]
\end{array}
$$

and the equation for g is

$$g = b + c + g\ (e + df).$$

We substitute the values of the variables and obtain

$$g = g,$$

i.e., party g has freedom of choice.

7. The group of gangs ceases to be superactive.
The situation corresponds to the graph

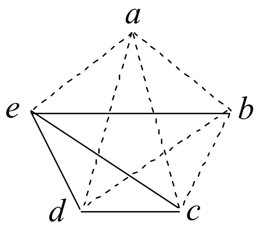

Fig. A2-13. Graph of relations for problem 7

the polynomial

$$a + e\,(b + c\,d),$$

and the diagonal form

$$\begin{array}{lllll}
 & & & & [c]\,[d] \\
 & & & [b] + [c\,d] & \\
 & & [e]\,[b + c\,d] & & \\
 & [a] + [e\,(b + c\,d)] & & & \\
[a + e\,(b + c\,d)] & & & & ,
\end{array}$$

which is equivalent to the initial polynomial not equal identically to 1. For example, if all variables take on the value of zero, the polynomial will be equal to zero.

Chapter 12

1. All countries are in a state of free choice.
After relations change between England and Germany, the graph becomes as follows:

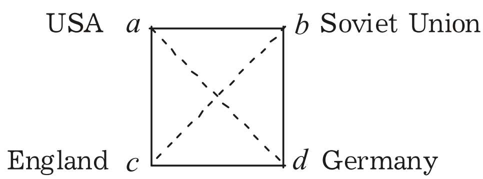

Fig. A2-14. Relations graph for problem 1

the polynomial:

$$(a + d)\ (b + c),$$

the diagonal form:

$$\begin{array}{ccccc} & & [a]+[d] & & [b]+[c] \\ & [a+d] & & [b+c] & \\ [(a+d)\ (b+c)] & & & & \end{array}$$

and the equations of the type

$$x = (a + d)\ (b + c),$$

where $x = a, b, c, d$.

We substitute the variables' values from the matrix of influences and find that each country is in a state of free choice.

2. Soviet Union is in a state of free choice, and other countries are in the active state.
The graph of relations is as follows:

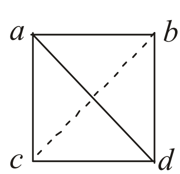

Fig. A2-15. Relations graph for problem 2

the polynomial:

$$ad\ (b + c),$$

the diagonal form:

$$[b] + [c]$$
$$[a]\ [d]\ [b + c]$$
$$[ad\ (b + c)]$$

and the equations for the countries:

$$x = b + c + \overline{a} + \overline{d}\ ,$$

where $x = a, b, c, d$.

Substituting the variables' values from the influences matrix, we obtain the states of the countries.

3. The subjects are in the superactive state.
The graph:

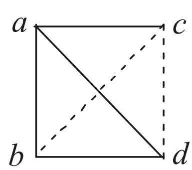

Fig. A2-16. Relations graph for problem 3

the polynomial:

$$a\ (c + bd),$$

and the diagonal form:

$$[b]\ [d]$$
$$[c] + [bd]$$
$$[a]\ [c + bd]$$
$$[a\ (c + bd)] \qquad \equiv 1.$$

4. The subjects are in the superactive state.
The graph of the situation:

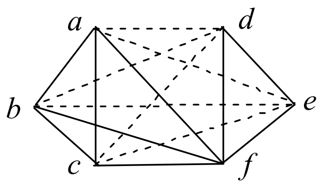

Fig. A2-17. Graph of relations for problem 4

the polynomial:

$$f\,(abc + de)$$

and the diagonal form:

$$[a]\ [b]\ [c] \qquad [d]\ [e]$$
$$[abc] \qquad + [de]$$
$$[f]\ [abc + de]$$
$$[f\ (abc + de)] \qquad \equiv 1.$$

5. China is in the active state, Russia and Taiwan are in the passive state, USA is in a state of free choice.
The graph:

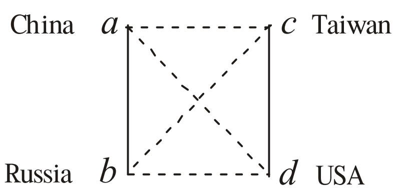

Fig. A2-18. Graph of relations for problem 5

the polynomial:

$$ab + cd,$$

the diagonal form:

$$[a]\ [b] \qquad [c]\ [d]$$
$$[ab] \qquad + [cd]$$
$$[ab + cd]$$

and the equations:

$$x = ab + cd,$$

where $x = a, b, c, d$. We substitute the values from the matrix of influences and find the states of the countries.

Chapter 13.

1. The battalion commander chooses crossing A.

The graph after relations change is

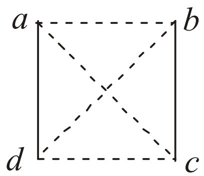

Fig. A2-19. Graph of relations for problem 1

the polynomial:

$$ad + bc\ ,$$

the diagonal form

$$[a]\,[d] \qquad\qquad [b]\,[c]$$
$$[ad] \qquad\qquad + [bc]$$
$$[ad + bc]$$

and the equation for the battalion commander:

$$d = ad + bc\ .$$

Crossing A attracts the battalion commander because it has not been captured by the enemy. This means that the commander is under influence $a = \{\alpha\}$. Crossings b and c repel the commander:

$$b = \overline{\{\beta\}} = \{\alpha, \gamma\},$$
$$\mathrm{c} = \overline{\{\gamma\}} = \{\alpha, \beta\}.$$

By substituting these values into the equation, we find that the battalion commander chooses $\{\alpha\}$, i.e., crossing A, which is in the hands of a platoon that has come over to the side of the battalion.

2. The peacemaker must cease his activity.

The situation corresponds to the graph

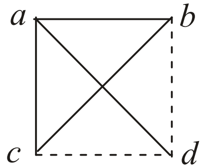

Fig. A2-20. Graph of relations for problem 2

the polynomial

$$a\ (bc + d)$$

and the diagonal form

$$\begin{array}{llll} & & [b]\,[c] & \\ & [bc] & & +\ [d] \\ [a]\,[bc + d] & & & \\ [a\ (bc + d)] & & \equiv 1. & \end{array}$$

The group is in the superactive state. Thus, tribe b continues to destroy tribe d. Although the peacemaker persuades the leaders of the tribes c and d to incline tribe b to stop the bloodshed, this does not change the situation. Subject b will be in the active state independently of any influences from subjects c and d.

If the peacemaker stops his activity, however, the problem will be solved. The graph will become:

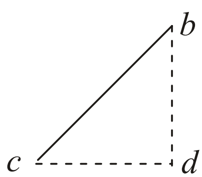

Fig. A2-21. Graph of relations for problem 2 after the peacemaker leaves.

the polynomial

$$d + bc,$$

and the diagonal form

$$
\begin{array}{c}
\qquad\qquad [b]\,[c] \\
\quad [d] + [bc] \\
[d + bc]
\end{array}
$$

and the equation for b is

$$b = d + bc.$$

The influence on b to cease hostilities is $c = 0$, $d = 0$. Thus, $b = 0$, which means that the bloodshed stops.

3. Country c prefers plane α.
The situation corresponds to the graph

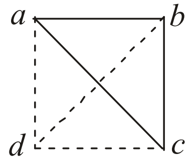

Fig. A2-22. Relations graph for problem 3

the polynomial

$$d + abc,$$

and the diagonal form

$$
\begin{array}{c}
\qquad\qquad [a]\,[b]\,[c] \\
\quad [d] + [abc] \\
[d + abc]
\end{array}
$$

and the equation for c is

$$c = d + abc.$$

Country a inclines country c to choose project α: $a = \{\alpha\}$; country b inclines country c to choose project β: $b = \{\beta\}$. The potential enemy, d, by its example inclines c to choose α: $d = \{\alpha\}$. By substituting these values into the equation for c, we find that
$c = \{\alpha\}$.

Chapter 14

1. The trial will no longer be perfect.

After the public prosecutor[1] joins the judicial process, the graph becomes:

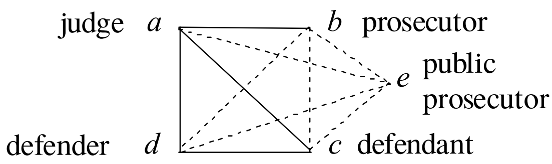

Fig. A2-23. Graph of relations for problem 1

This graph corresponds to the polynomial

$$e + a\,(b + cd),$$

and the diagonal form

$$
\begin{array}{lllll}
 & & & & [c]\,[d] \\
 & & & [b] + [cd] & \\
 & & [a]\,[b + cd)] & & \\
 & [e] \ + [a\,(b + cd)] & & & \\
[e + a\,(b + cd)] & & & &
\end{array}
$$

and the equation for the judge is:

$$a = e + a\,(b + cd).$$

Suppose the defender demands that the case be dropped ($d = 0$). After that, the equation for the judge becomes

$$a = e + ab.$$

We see that the judge depends on the two prosecutors b and e. If they demand conviction ($b = e = \{\alpha\}$), the defendant will be convicted; if they demand acquittal ($b = e = \{\beta\}$), the defendant will be acquitted.

---

[1]In the Soviet Union, so-called "public representatives" were included in the process of a trial as public prosecutors or public defenders.

Finally, if they demand that the case be dropped ($b = e = 0$), the case will be dropped. This trial is not perfect, because there are cases in which the judge chooses alternatives that differ from 1.

2. The trial remains perfect.
After the public defender joins the judicial process, the graph becomes

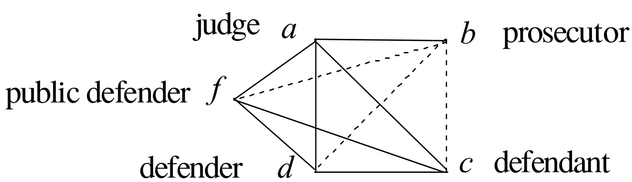

Fig. A2-24. Relations graph for problem 2

the polynomial

$$a\,(b + cdf\,),$$

and the diagonal form

$$
\begin{array}{llll}
 & & & [c]\,[d]\,[f\,] \\
 & & [b] + [cdf\,] & \\
 & [a]\,[b + cdf\,] & & \\
[a\,(b + cdf\,)] & & & \equiv 1.
\end{array}
$$

Therefore, regardless of influences, the judge chooses alternative 1.

3. The trial will not be perfect.
After the defendant is removed from the hall, the graph becomes

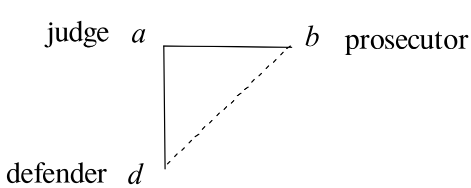

Fig. A2-25. Relations graph for problem 3

the polynomial

$$a\ (b + d),$$

and the diagonal form

$$\begin{array}{lll} & & [b] + [d] \\ & [a]\ [b + d] & \\ [a\ (b + d)] & & \end{array}$$

and the equation for the judge is

$$a = (b + d)a + \overline{a}\ .$$

If the prosecutor demands that the defendant be declared guilty, and the defender insists that the case be dropped: $b = \{\alpha\}$, $d = 0$, the equation for the judge has no solution, i.e., the judge in a state of frustration. Thus, there is a case in which the judge does not choose alternative 1. Therefore, the trial is not perfect.

Conclusion

1. The set of my alternatives is {1, 0}; 1 - to go, 0 - to stay home. The graph of relations, where a and b are my friends, is

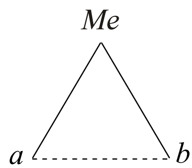

Fig. A2-26. Relations graph for problem 1

the diagonal form

$$\begin{array}{lll} & & [a] + [b] \\ & [Me]\ [a + b] & \\ [Me(a + b)] \quad , & & \end{array}$$

and the equation for me

$$Me = (a + \mathrm{b})Me + \overline{Me}.$$

My friends do not invite me: $a = 0$, $b = 0$, thus,

$$Me = \overline{Me}.$$

I am in frustration. I do not have a choice that would follow the anti-selfishness principle. This may serve as a stimulus to reconsider the situation. For example, perhaps I can invite my friends to visit me. In other words, I create a new pair of alternatives: invite friends for visit (1) – do not invite (0). The same equation corresponds to Me, but the values of a and b are different. I know that my friends want to see me, i.e., $a = 1$, $b = 1$. After substituting these values into equation, I find $Me = 1$. The model tells me that by choosing the alternative “to invite” I will act in accord with the anti-selfishness principle.