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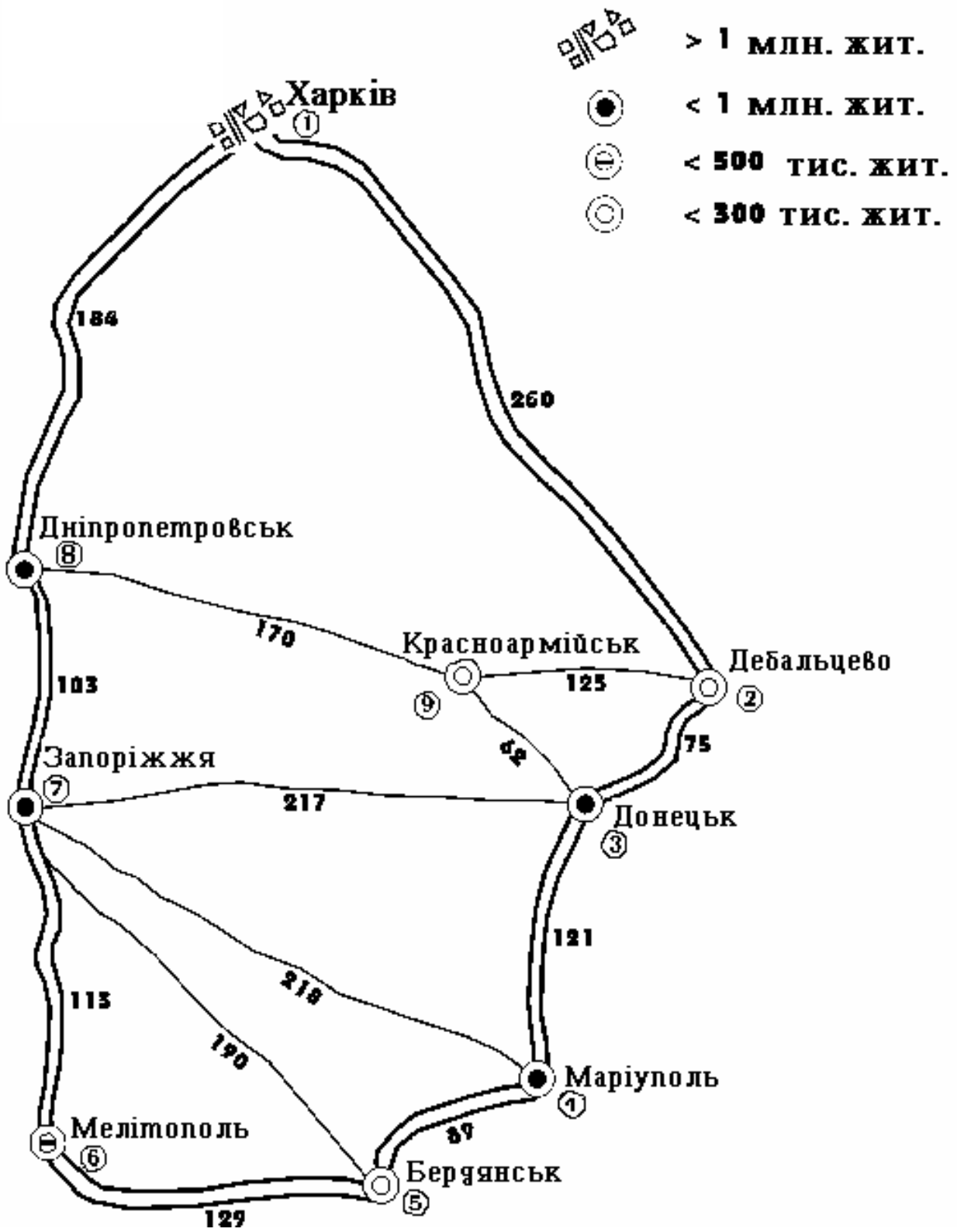
6 5 2003 .

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- 1.
- 2.
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- 4.
- 5.





## 1.1.

$Q_{ij}$  ,  
 $i$  ,  $j$  .  
 ,  
 1990 . , 0,2 - 2  $\frac{1}{10}$  . ,  
 ,  
 -  
 , .  
 , .2.

2

										$\sum_{j=1}^g Q_{ij}$
	1	2	3	4	5	6	7	8	9	
1	-	5	10	8	5	6	9	10	3	56
2	4	-	5	6	4	4	5	6	2	36
3	8	5	-	4	3	4	8	10	5	47
4	6	3	5	-	2	3	6	7	2	34
5	7	4	6	3	-	3	6	7	3	39
6	6	3	5	4	3	-	6	7	2	36
7	9	5	7	4	5	4	-	8	4	46
8	10	4	7	5	6	5	7	-	5	49
9	5	3	6	3	4	3	6	6	-	36
$\sum_{j=1}^g Q_{ij}$	55	32	51	37	32	32	53	61	26	

## 1.2.

, , ,  
 ,  
 $t_{\min}$  .  
 :  
 $W_{\min} = \cdot t_{\min}$  .  
 ,

0,2 - 20

400

.3.

3

(i)	1	2	3	4	5	6	7	8	9
$W_i,$ ( )	400	320	350	330	310	300	370	390	310
$C_i, ( \cdot / )$	2	3	3	3	5	4	2	2	5

**1.3.** $W_i,$ 

$$W_1^1 = W_1 - \sum_{j \neq i} Q_{ij} - \sum_{j \neq i} Q_{ji}.$$

$i = 1, 2, 3 \dots 9, \quad Q_{ij}, Q_{ji} -$   
( . . 2).

$$W_1^1 = W_1 - Q_{12} - Q_{13} - Q_{14} - Q_{15} - Q_{16} - Q_{17} - Q_{18} - Q_{19} - Q_{21} - Q_{31} - Q_{41} - Q_{51} - Q_{61} - Q_{71} - Q_{81} - Q_{91} = 400 - 5 - 10 - 8 - 5 - 6 - 9 - 10 - 3 - 4 - 8 - 6 - 7 - 6 - 9 - 10 - 5 = 400 - 56 - 55 = 289.$$

$$W_2^1 = W_2 - \sum_{j=1}^9 Q_{2j} - \sum_{i=1}^9 Q_{i2} = 320 - 36 - 32 = 252,$$

$$W_3^1 = W_3 - \sum_{j=1}^9 Q_{3j} - \sum_{i=1}^9 Q_{i3} = 350 - 47 - 51 = 252,$$

$$W_4^1 = W_4 - \sum_{j=1}^9 Q_{4j} - \sum_{i=1}^9 Q_{i4} = 330 - 34 - 37 = 259,$$



$$W_5^1 = W_5 - \sum_{j=1}^9 Q_{5j} - \sum_{i=1}^9 Q_{i5} = 310 - 39 - 32 = 239,$$

$$W_6^1 = W_6 - \sum_{j=1}^9 Q_{6j} - \sum_{i=1}^9 Q_{i6} = 300 - 36 - 32 = 232,$$

$$W_7^1 = W_7 - \sum_{j=1}^9 Q_{7j} - \sum_{i=1}^9 Q_{i7} = 370 - 46 - 53 = 271,$$

$$W_8^1 = W_8 - \sum_{j=1}^9 Q_{8j} - \sum_{i=1}^9 Q_{i8} = 390 - 49 - 61 = 280,$$

$$W_9^1 = W_9 - \sum_{j=1}^9 Q_{9j} - \sum_{i=1}^9 Q_{i9} = 310 - 36 - 26 = 248.$$

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$\alpha_{ij}, B_i, C_j -$

$j, X_j -$   
 $X_j,$

$\alpha_{ij} = 1, C_j -$

$j-$

$Q_{ij}$   
 $i, j,$   
 $Q_{ij}.$   
 $W_i^1.$

### 2.1.1.

1

:

$$X_{123} = Q_{13},$$

$$X_{321} = Q_{31},$$

$$X_{1234} + X_{1874} = Q_{14},$$

$$X_{4321} + X_{4781} = Q_{41},$$

$$X_{12345} + X_{18765} + X_{1875} = Q_{15},$$

$$X_{54321} + X_{56781} + X_{5781} = Q_{51},$$

$$X_{1876} = Q_{16},$$

$$X_{6781} = Q_{61},$$

$$X_{187} = Q_{17},$$

$$X_{781} = Q_{71},$$

$$X_{129} + X_{189} = Q_{19},$$

$$X_{921} + X_{981} = Q_{91}.$$

$$X_{123}, X_{321}, X_{1876}, X_{6781}, X_{187}, X_{781}$$

2

:

$$X_{23456} + X_{29876} + X_{2376} = Q_{26},$$

$$X_{65432} + X_{67892} + X_{6732} = Q_{62},$$

$$X_{2987} + X_{237} = Q_{27},$$

$$X_{7892} + X_{732} = Q_{72},$$

$$X_{298} + X_{218} = Q_{28},$$

$$X_{892} + X_{812} = Q_{82}.$$

3:

$$X_{3456} + X_{376} = Q_{36},$$

$$X_{6543} + X_{673} = Q_{63},$$

$$X_{398} + X_{378} = Q_{38},$$

$$X_{893} + X_{873} = Q_{83},$$

$$X_{375} + X_{345} = Q_{35},$$

$$X_{573} + X_{543} = Q_{53}.$$

4:

$$X_{478} + X_{4398} = Q_{48},$$

$$X_{874} + X_{8934} = Q_{84},$$

$$X_{476} + X_{456} = Q_{46},$$

$$X_{674} + X_{654} = Q_{64}.$$

6:

$$X_{6789} + X_{65439} = Q_{69},$$

$$X_{9876} + X_{93456} = Q_{96}.$$

7:

$$X_{789} + X_{739} = Q_{79},$$

$$X_{987} + X_{937} = Q_{97}.$$

22

$$X_{218} + X_{812} \leq W_1^1,$$

$$X_{1234} + X_{4321} + X_{12345} + X_{54321} + X_{129} + X_{921} \leq W_2^1,$$

$$X_{1234} + X_{4321} + X_{12345} + X_{54321} + X_{23456} + X_{65432} + X_{2376} + X_{6732} + X_{237} + X_{732} + X_{4398} + \\ + X_{8934} + X_{65439} + X_{93456} + X_{739} + X_{937} \leq W_3^1,$$

$$X_{12345} + X_{54321} + X_{23456} + X_{65432} + X_{3456} + X_{6543} + X_{65439} + X_{93456} + X_{345} + X_{543} \leq W_4^1,$$

$$X_{23456} + X_{65432} + X_{3456} + X_{6543} + X_{65439} + X_{93456} + X_{456} + X_{654} \leq W_5^1,$$

$$X_{18765} + X_{56781} \leq W_6^1,$$

$$X_{1874} + X_{4781} + X_{18765} + X_{56781} + X_{1875} + X_{5781} + X_{375} + X_{573} + X_{29876} + X_{67892} + X_{2376} + \\ + X_{6732} + X_{376} + X_{673} + X_{476} + X_{674} + X_{378} + X_{873} + X_{6789} + X_{9876} \leq W_7^1,$$

$$\begin{aligned}
& X_{1874} + X_{4781} + X_{18765} + X_{56781} + X_{1875} + X_{5781} + X_{189} + X_{981} + X_{29876} + X_{67892} + X_{2987} + \\
& \quad + X_{7892} + X_{6789} + X_{9876} + X_{789} + X_{987} \leq W_8^1, \\
& X_{29876} + X_{67892} + X_{2987} + X_{7892} + X_{298} + X_{892} + X_{398} + X_{893} + X_{4398} + X_{8934} \leq W_9^1.
\end{aligned}$$

### 2.1.2.

$$\begin{aligned}
Z = & C_1(X_{218} + X_{812}) + C_2(X_{1234} + X_{4321} + X_{12345} + X_{54321} + X_{129} + X_{921}) + \\
& + C_3(X_{1234} + X_{4321} + X_{12345} + X_{54321} + X_{23456} + X_{65432} + X_{2376} + X_{6732} + X_{237} + \\
& + X_{732} + X_{4398} + X_{8934} + X_{65439} + X_{93456} + X_{739} + X_{937}) + C_4(X_{12345} + X_{54321} + \\
& + X_{23456} + X_{65432} + X_{3456} + X_{6543} + X_{65439} + X_{93456}) + C_5(X_{23456} + X_{65432} + \\
& + X_{3456} + X_{6543} + X_{65439} + X_{93456}) + C_6(X_{18765} + X_{56781}) + C_7(X_{1874} + X_{4781} + \\
& + X_{18765} + X_{56781} + X_{1875} + X_{5781} + X_{29876} + X_{67892} + X_{2376} + X_{6732} + X_{376} + \\
& + X_{673} + X_{378} + X_{873} + X_{6789} + X_{9876}) + C_8(X_{1874} + X_{4781} + X_{18765} + X_{56781} + \\
& + X_{1875} + X_{5781} + X_{189} + X_{981} + X_{29876} + X_{67892} + X_{2987} + X_{7892} + X_{6789} + X_{9876} + \\
& + X_{789} + X_{987}) + C_9(X_{29876} + X_{67892} + X_{2987} + X_{7892} + X_{298} + X_{892} + X_{398} + X_{893} + \\
& \quad + X_{4398} + X_{8934}).
\end{aligned}$$

+1.

### 2.2.

### 2.2.1.

$$\begin{aligned}
 & \vdots \\
 & X_{129} + X_{189} = Q_{19}, \\
 & X_{921} + X_{981} = Q_{91}, \\
 & X_{298} + X_{218} = Q_{28}, \\
 & X_{892} + X_{812} = Q_{82}, \\
 & X_{398} + X_{378} = Q_{38}, \\
 & X_{893} + X_{873} = Q_{83}, \\
 & X_{789} + X_{739} = Q_{79}, \\
 & X_{987} + X_{937} = Q_{97}, \\
 & X_{375} + X_{345} = Q_{35}, \\
 & X_{573} + X_{543} = Q_{53}, \\
 & X_{476} + X_{456} = Q_{46}, \\
 & X_{674} + X_{654} = Q_{64}, \\
 & X_{218} + X_{812} \leq W_1^1, \\
 & X_{129} + X_{921} \leq W_2^1, \\
 & X_{739} + X_{937} \leq W_3^1, \\
 & X_{375} + X_{573} + X_{378} + X_{873} + X_{476} + X_{674} \leq W_7^1, \\
 & X_{189} + X_{981} + X_{789} + X_{987} \leq W_8^1, \\
 & X_{298} + X_{892} + X_{398} + X_{893} \leq W_9^1, \\
 & X_{345} + X_{543} \leq W_4^1, \\
 & X_{456} + X_{654} \leq W_5^1.
 \end{aligned}$$

$$\begin{aligned}
 & \vdots \\
 & Z = C_1(X_{218} + X_{812}) + C_2(X_{129} + X_{921}) + C_3(X_{739} + X_{937}) + C_4(X_{345} + X_{543}) + \\
 & + C_5(X_{456} + X_{654}) + C_7(X_{375} + X_{573} + X_{378} + X_{873} + X_{476} + X_{674}) + C_8(X_{189} + X_{981} + \\
 & + X_{789} + X_{987}) + C_8(X_{298} + X_{892} + X_{398} + X_{893}).
 \end{aligned}$$

### 2.2.2.

4

	1	2	3	4	5	6	7	8	9
1									2,8
2								9,1	
3					7,4			9,7	
4						7,5			
5			7,4						
6				7,5					
7									8,3
8		9,1	9,7						
9	2,8						8,3		

$Q_{19}, Q_1, X_{19}^2, X_{21}, Q_{28}, Q_2, X_{19}^8, X_{81}, X_{64}^5, X_{57}, Q_{35}, Q_3, X_{28}^9, X_{92}, X_{79}^8, X_{88}, Q_{38}, Q_4, X_{28}^1, X_{12}, X_{79}^3, X_{38}, Q_{46}, Q_5, X_{35}^7, X_{73}, X_{82}^9, X_{99}, Q_{53}, Q_6, X_{35}^4, X_{43}, X_{82}^1, X_{19}, Q_{64}, Q_7, X_{38}^9, X_{94}, X_{83}^9, X_{9,10}, Q_{79}, Q_8, X_{38}^7, X_{74}, X_{83}^7, X_{7,10}$

5

$Q_{19}$	$Q_1$	$X_{19}^2$	$X_{21}$	$X_{64}^7$	$X_{77}$
$Q_{28}$	$Q_2$	$X_{19}^8$	$X_{81}$	$X_{64}^5$	$X_{57}$
$Q_{35}$	$Q_3$	$X_{28}^9$	$X_{92}$	$X_{79}^8$	$X_{88}$
$Q_{38}$	$Q_4$	$X_{28}^1$	$X_{12}$	$X_{79}^3$	$X_{38}$
$Q_{46}$	$Q_5$	$X_{35}^7$	$X_{73}$	$X_{82}^9$	$X_{99}$
$Q_{53}$	$Q_6$	$X_{35}^4$	$X_{43}$	$X_{82}^1$	$X_{19}$
$Q_{64}$	$Q_7$	$X_{38}^9$	$X_{94}$	$X_{83}^9$	$X_{9,10}$
$Q_{79}$	$Q_8$	$X_{38}^7$	$X_{74}$	$X_{83}^7$	$X_{7,10}$

$Q_{82}$	$Q_9$	$X_{46}^7$	$X_{75}$	$X_{91}^2$	$X_{2,11}$
$Q_{83}$	$Q_{10}$	$X_{46}^5$	$X_{55}$	$X_{91}^8$	$X_{8,11}$
$Q_{91}$	$Q_{11}$	$X_{53}^7$	$X_{76}$	$X_{97}^8$	$X_{8,12}$
$Q_{97}$	$Q_{12}$	$X_{53}^4$	$X_{46}$	$X_{97}^3$	$X_{3,12}$

5, 6, 7, 8, 9,

$W_6^1, W_7^1, W_8^1, W_9^1,$

2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

$Q_{10}, Q_{11}, Q_{12}.$

. 6.

1, 2, 3, 4,

$W_1^1, W_2^1, W_3^1, W_4^1, W_5^1,$

1,

$Q_1, Q_2, Q_3, Q_4, Q_5, Q_6, Q_7, Q_8, Q_9,$

,

$M. M$

$$\sum_{i=1}^9 W_i^1 \geq \sum_{j=1}^{12} Q_j.$$

$$Q_\phi = \sum_{i=1}^9 W_i^1 - \sum_{j=1}^{12} Q_j.$$

6

	1	2	3	4	5	6	7	8	9	10	11	12		$W_i$
1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	$W_1^1$
2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	$W_2^1$
3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	$W_3^1$
4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	$W_4^1$
5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	$W_5^1$
7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	$W_7^1$
8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	$W_8^1$
9	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	$W_9^1$
$Q_j$	$Q_1$	$Q_2$	$Q_3$	$Q_4$	$Q_5$	$Q_6$	$Q_7$	$Q_8$	$Q_9$	$Q_{10}$	$Q_{11}$	$Q_{12}$	$Q_\phi$	

9 13, 24 ,



$X_{ij}$

$C_i$

( ),

. 6. , ,  $X_{12}, X_{19}, X_{55}, X_{57}, X_{43}, X_{72}, X_{74}, X_{75}, X_{76}, X_{77}, X_{7,10}, X_{92}, X_{94}, X_{99}, X_{9,10}$ ,  
 $X_{21}, X_{2,11}, X_{38}, X_{3,12}, X_{81}, X_{88}, X_{8,11}, X_{8,12}$  - .

5 1, 5, 4, 7, 9 8 2, 3, 4, 5, 6,  
 7, 9, 10, - 3 2, 3, 8 4 1, 8, 11,  
 12. . 7 8.  
 7

	2	3	4	5	6	7	9	10		$W_i$
1	<u>1</u>						<u>1</u>			$W_1^1$
5				<u>5</u>		<u>5</u>				$W_5^1$
4		<u>4</u>			<u>4</u>					$W_4^1$
7		<u>7</u>	<u>7</u>	<u>7</u>	<u>7</u>	<u>7</u>		<u>7</u>		$W_7^1$
9	<u>9</u>		<u>9</u>				<u>9</u>	<u>9</u>		$W_9^1$
$Q_j$	$Q_2$	$Q_3$	$Q_4$	$Q_5$	$Q_6$	$Q_7$	$Q_9$	$Q_{10}$	$Q_\phi$	$\sum Q_j$

8

	1	8	11	12		$W_i$
2	<u>2</u>		<u>2</u>			$W_2^1$
3		<u>3</u>		<u>3</u>		$W_3^1$
8	<u>8</u>	<u>8</u>	<u>8</u>	<u>8</u>		$W_8^1$
$Q_j$	$Q_1$	$Q_8$	$Q_{11}$	$Q_{12}$	$Q_\phi$	$\sum Q_j$

3.

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3.1.

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$$Z = Z_1 + Z_2.$$

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1. ( . ).

$$\begin{aligned} C_1 = 2, C_2 = 3, C_3 = 3, C_4 = 4, \\ C_1 = 2, C_7 = 2, C_1 = 2, C_1 = 2 \end{aligned}$$

2. ,

$$\begin{aligned} Q_1 = Q_{19} = 3, Q_2 = Q_{28} = 6, Q_3 = Q_{35} = 3, Q_4 = Q_{38} = 10, Q_5 = Q_{46} = 3, \\ Q_6 = Q_{53} = 6, Q_7 = Q_{64} = 4, Q_8 = Q_{79} = 4, Q_9 = Q_{82} = 4, Q_{10} = Q_{83} = 7, \\ Q_{11} = Q_{91} = 5, Q_{12} = Q_{97} = 6. \end{aligned}$$

3. :

$$\begin{aligned} W_1^1 = 289, W_2^1 = 252, W_3^1 = 252, W_4^1 = 259, W_5^1 = 239, W_7^1 = 271, \\ W_8^1 = 280, W_9^1 = 248. \end{aligned}$$

4. ( )

$$\begin{aligned} Q_{\phi 1} &= \sum_{i=1}^9 W_i - \sum_{j=1}^{12} Q_j = (W_1^1 + W_5^1 + W_4^1 + W_7^1 + W_9^1) - (Q_2 + Q_3 + Q_4 + Q_5 + Q_6 + Q_7 + \\ &+ Q_{10}) = (289 + 239 + 259 + 271 + 248) - (6 + 3 + 10 + 3 + 6 + 4 + 4 + 7) = \\ &= 1306 - 43 = 1263. \end{aligned}$$

$$Q_{\phi_2} = (W_2' + W_3' + W_8') - (Q_1 + Q_8 + Q_{11} + Q_{12}) = (252 + 252 + 280) - (3 + 4 + 5 + 6) = 784 - 18 = 766.$$

5.  $M = 900$ .

	2	3	4	5	6	7	9	10		$W_i^1$
1	2	900	900	900	900	900	2	900	0	289
5	900	900	900	5	900	5	900	900	0	239
4	900	3	900	900	3	900	900	900	0	259
7	900	2	2	2	2	2	900	2	0	271
9	5	900	5	900	900	900	5	5	0	248
$Q_j$	6	3	10	3	6	4	4	7	1263	1306

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$$X_{12} = X_{28}^1,$$

$$X_{92} = X_{28}^9,$$

..

$$Q_2 = Q_{28} = X_{12} + X_{92} = X_{28}' + X_{28}^9 = 6$$

$$W_1' = X_{12} + X_{19} + X_{1\phi} = X_{28}' + X_{82}' + X_{1\phi} = 289.$$

. 9:

$$Q_2 = Q_{28} = X_{12} + X_{92} = X_{28}' + X_{28}^9 = 6,$$

$$Q_3 = Q_{35} = X_{43} + X_{73} = X_{35}^4 + X_{35}^7 = 3,$$

$$Q_4 = Q_{38} = X_{74} + X_{94} = X_{38}^7 + X_{38}^9 = 10,$$

$$Q_5 = Q_{46} = X_{55} + X_{75} = X_{46}^5 + X_{46}^7 = 3,$$

$$Q_6 = Q_{53} = X_{46} + X_{76} = X_{53}^4 + X_{53}^7 = 6,$$

$$Q_7 = Q_{64} = X_{57} + X_{77} = X_{64}^5 + X_{64}^7 = 4,$$

$$Q_9 = Q_{82} = X_{19} + X_{99} = X_{82}' + X_{82}^9 = 4,$$

$$Q_{10} = Q_{83} = X_{7,10} + X_{9,10} = X_{83}^7 + X_{83}^9 = 7,$$

$$W_1' = X_{12} + X_{19} + X_{1\phi} = 289,$$

$$W_5' = X_{55} + X_{57} + X_{5\phi} = 239,$$

$$W_4' = X_{43} + X_{46} + X_{4\phi} = 259,$$

$$W_7' = X_{73} + X_{74} + X_{75} + X_{76} + X_{77} + X_{7,10} + X_{7\phi} = 271,$$

$$W_9' = X_{92} + X_{94} + X_{99} + X_{9,10} + X_{9\phi} = 248.$$

2 . 10 :

10

	1	8	11	12		$W_i'$
2	3	900	3	900	0	252
3	900	3	900	3	0	252
8	2	2	2	2	0	280
$Q_j$	3	4	5	6	766	784

. 10,

,

$$Q_1 = Q_{19} = X_{21} + X_{81} = X_{19}^2 + X_{19}^8 = 3,$$

$$Q_8 = Q_{79} = X_{38} + X_{88} = X_{79}^3 + X_{79}^8 = 4,$$

$$Q_{11} = Q_{91} = X_{2,11} + X_{8,11} = X_{91}^2 + X_{91}^8 = 5,$$

$$Q_{12} = Q_{97} = X_{3,12} + X_{8,12} = X_{97}^3 + X_{97}^8 = 6,$$

$$W_2' = X_{21} + X_{2,11} + X_{2\phi} = 252,$$

$$W_3' = X_{38} + X_{3,12} + X_{3\phi} = 252,$$

$$W_8' = X_{81} + X_{88} + X_{8,11} + X_{8,12} + X_{8\phi} = 280.$$

### 3.2.

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1 .9:

1.

(1, 2, 3, 4, 5),

. 9 (1, 5, 4, 7, 9).

(1, 2, 3, 4, 5, 6, 7, 8, 9),

. 9 (2, 3, 4, 5, 6, 7, 9, 11, ).

2.

$C_{ij}$

$i$

$j$

:

$$C(1,1) = C_1 = 2, C(1,2) = M = 900, C(1,3) = M = 900, \dots, C(1,9) = C_1 = 2 \dots$$

3. (  $M = 5$ ):

$$A(1) = W_1' = 289, A(2) = W_5' = 239, A(3) = W_4' = 259,$$

$$A(4) = W_7' = 271, A(5) = W_9' = 248.$$

4. (  $N = 9$ )

$$B(1) = Q_2 = 6, B(2) = Q_3 = 3, B(4) = Q_5 = 3, B(5) = Q_6 = 6, B(6) = Q_7 = 4,$$

$$B(7) = Q_9 = 4, B(8) = Q_{10} = 7, B(9) = Q_\phi = 1263.$$

5.  $X_{ij}$ :

$$X(1,1) = X_{12}, X(1,2) = X_{13}, \dots, X(1,9) = X_{1\phi}, \dots, X(2,9) = X_{5\phi} \dots$$

. 9, , . 11.

11

	1	2	3	4	5	6	7	8	9	$A_i$
1	2	900	900	900	900	900	2	900	0	289
2	900	900	900	5	900	5	900	900	0	239
3	900	3	900	900	3	900	900	900	0	259
4	900	2	2	2	2	2	900	2	0	271
5	5	900	5	900	900	900	5	5	0	248
$B_j$	6	3	10	3	6	4	4	7	1263	1306

2,

. 10

:

1.

(1, 2, 3),

. 10 (2, 3, 8).

(1, 2, 3, 4, 5),

. 10 (1, 8, 11, 12, ).

2.

:

$$C(1,1) = C_2 = 3, C(1,2) = M = 900, C(1,3) = M = 900, C(1,3) = C_2 = 3$$

$$C(1,4) = M = 900, C(1,5) = 0 \dots$$

3.

(  $M = 3$ ):

$$A(1) = W_2' = 252, A(2) = W_3' = 252, A(3) = W_8' = 280.$$

4.

(  $N = 5$ ):

$$B(1) = Q_1 = 3, B(2) = Q_8 = 4, B(3) = Q_{11} = 5, B(4) = Q_{12} = 6, B(5) = Q_\phi = 766.$$

5.

:

$$X(1,1) = X_{21}, X(1,2) = X_2, X(1,3) = X_{2,11}, X(1,4) = X_{2,12}, X(1,5) = X_{2\phi} \dots$$

. 10

. 12.

12

	1	2	3	4	5	$A_i$
1	3	900	3	900	0	252
2	900	3	900	3	0	252
3	2	2	2	2	0	280
$B_j$	3	4	5	6	766	784

. 13 .

13

	$X_{12}$	$X_{19}$	$X_{73}$	$X_{74}$	$X_{75}$	$X_{76}$	$X_{77}$
	$X(1,1)$	$X(1,7)$	$X(4,2)$	$X(4,3)$	$X(4,4)$	$X(4,5)$	$X(4,6)$

$X_{7,10}$	$X_{81}$	$X_{88}$	$X_{8,11}$	$X_{8,12}$
$X(4,8)$	$X(3,1)$	$X(3,2)$	$X(3,3)$	$X(3,4)$

3.3.

1

. 14.

$$Z = 29720, \quad Z = 86.$$

14

	1	2	3	4	5	6	7	8	9	$A_i$
1	2 6	900	900	900	900	900	2 4	900	0 279	289
2	900	900	900	5	900	5	900	900	0 239	239
3	900	3	900	900	3	900	900	900	0 259	259
4	900	2 3	2 10	2 3	2 6	2 4	900	2 7	0 238	271
5	5	900	5	900	900	900	5	5	0 248	248
$B_j$	6	3	10	3	6	4	4	7	1263	1306

2

. 15.

$$Z = 9024, \quad Z = 36.$$

15

	1	2	3	4	5	$A_i$
1	3	900	3	900	0	252
					252	
2	900	3	900	3	0	252
					252	
3	2	2	2	2	0	280
	3	4	5	6	262	
$B_j$	3	4	5	6	766	784

.5 13.

( )

1:

$$X(1,1) = X_{12} = X_{28}^1 = 6, \quad Z_{28}^1 = C_1 X_{28}^1 = 12,$$

$$X(1,7) = X_{12} = X_{82}^1 = 4, \quad Z_{82}^1 = C_1 X_{82}^1 = 8,$$

$$X(1,9) = X_{1\phi} = 279,$$

$$X(2,9) = X_{5\phi} = 239,$$

$$X(3,9) = X_{4\phi} = 259,$$

$$X(4,2) = X_{73} = X_{35}^7 = 3, \quad Z_{35}^7 = C_7 X_{35}^7 = 6,$$

$$X(4,3) = X_{74} = X_{38}^7 = 10, \quad Z_{38}^7 = C_7 X_{38}^7 = 20,$$

$$X(4,4) = X_{75} = X_{46}^7 = 3, \quad Z_{46}^7 = C_7 X_{46}^7 = 6,$$

$$X(4,5) = X_{76} = X_{53}^7 = 6, \quad Z_{53}^7 = C_7 X_{53}^7 = 12,$$

$$X(4,6) = X_{77} = X_{64}^7 = 4, \quad Z_{64}^7 = C_7 X_{64}^7 = 8,$$

$$X(4,8) = X_{7,10} = X_{83}^7 = 7, \quad Z_{83}^7 = C_7 X_{83}^7 = 14,$$

$$X(4,9) = X_{7\phi} = 238,$$

$$X(5,9) = X_{9\phi} = 248.$$

$$Z_1 = 86( \cdot ).$$

2:

$$X(1,5) = X_{2\phi} = 252,$$

$$X(2,5) = X_{3\phi} = 252,$$

$$X(3,1) = X_{81} = X_{19}^8 = 3, \quad Z_{19}^8 = C_8 X_{19}^8 = 6,$$

$$X(3,2) = X_{88} = X_{79}^8 = 4, \quad Z_{79}^8 = C_8 X_{79}^8 = 8,$$

$$X(3,3) = X_{8,11} = X_{91}^8 = 5, \quad Z_{91}^8 = C_8 X_{91}^8 = 10,$$

$$X(3,4) = X_{8,12} = X_{97}^8 = 6, Z_{97}^8 = C_8 X_{97}^8 = 12,$$

$$X(3,5) = X_{8\phi} = 262.$$

$$Z_2 = 36 ( \quad \cdot \quad ).$$

$$Z = Z_1 + Z_2 = 86 + 36 = 122 ( \quad \cdot \quad ).$$

:

$$( \quad \cdot 4)$$

. 16.

16

2	8	1	12	9	30
8	2	1	8	9	20
3	5	7	6	4	9
5	3	7	12	4	18
3	8	7	20	9	50
8	3	7	14	9	35
4	6	7	6	5	15
6	4	7	8	5	20
1	9	8	6	2	9
9	1	8	10	2	15
7	9	8	8	3	12
9	7	8	12	3	18

,

122 . ,

251 . .

4.

. 2.

( ),

10.

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. 17 18.

17

(i)	1	2	3	4	5	6	7	8	9	10
$W_i$ ( . )	400	320	350	330	310	300	370	390	310	1917
$C_i$ ( . ./ .)	2	3	3	3	5	4	2	2	5	1

18

											$\sum_{j=1}^{10} Q_{ij}$
	1	2	3	4	5	6	7	8	9	10	
1	-	5	10	8	5	6	9	10	3	100	156
2	4	-	5	6	4	4	5	6	2	80	116
3	8	5	-	4	3	4	8	10	5	70	117
4	6	3	5	-	2	3	6	7	2	60	94
5	7	4	6	3	-	3	6	7	3	50	99
6	6	3	5	4	3	-	6	7	2	70	106
7	9	5	7	4	5	4	-	8	4	80	126
8	10	4	7	5	6	5	7	-	5	90	139
9	5	3	6	3	4	3	6	6	-	60	106
10	90	70	70	50	60	80	90	70	70	-	
$\sum_{i=1}^{10} Q_{ij}$	145	102	121	87	92	112	143	131	96		

$$W_i^1 = W_i - \sum_{j \neq i} Q_{ij} - \sum_{j \neq i} Q_{ji},$$

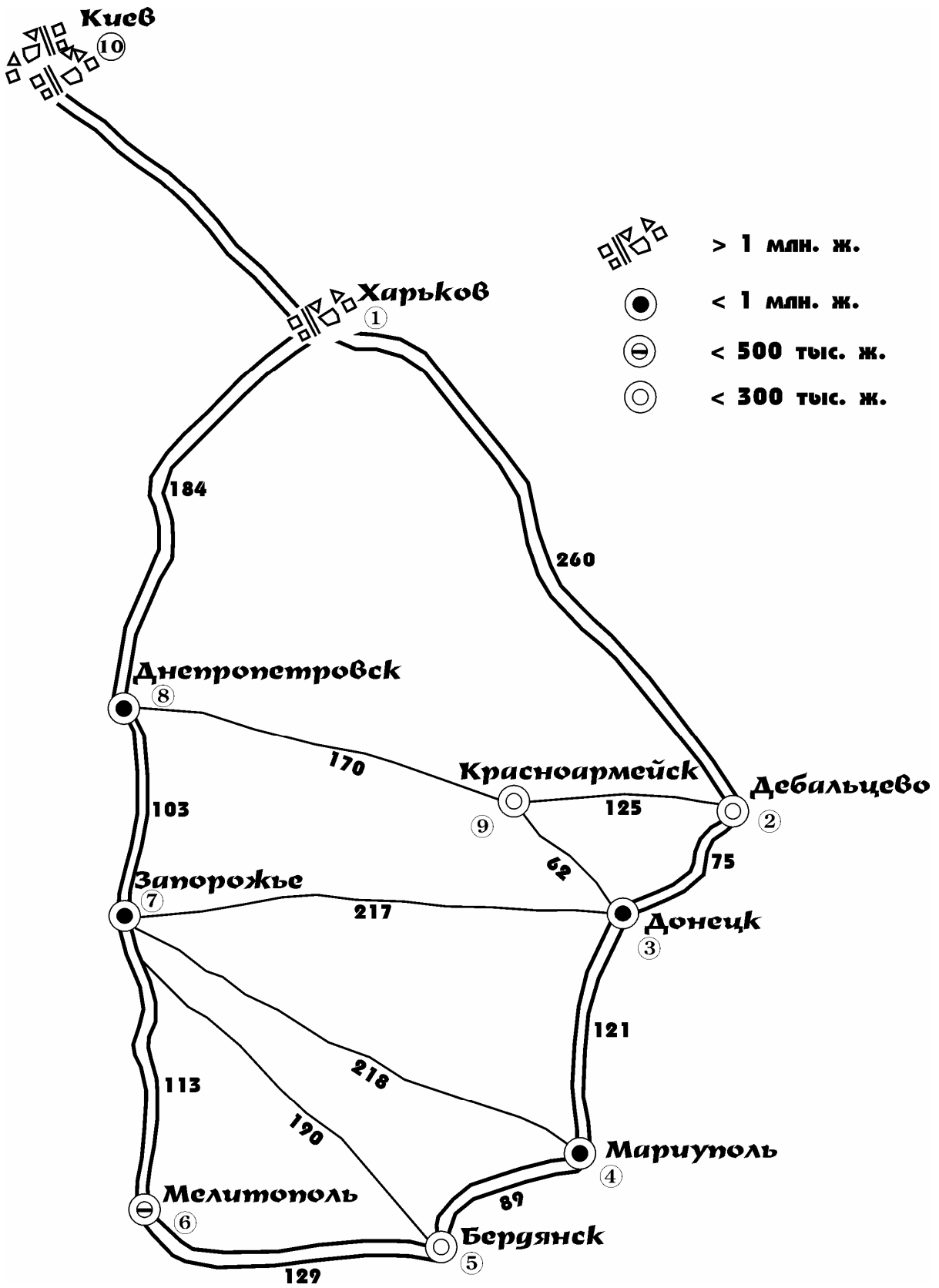
$$i = 1, 2, 3, \dots, 10, \quad Q_{ij}, Q_{ji} -$$

( . 18).

. 19.

19

, i	1	2	3	4	5	6	7	8	9	10
$W_i^1$	99	102	112	149	119	82	101	120	108	607





$$+ X_{1,10,9} + X_{9,10,1} + X_{7,10,9} + X_{9,10,7} + X_{3,10,5} + X_{5,10,3} + X_{3,10,8} + X_{8,10,3} + X_{4,10,6} + \\ + X_{6,10,4} + X_{1,10,9} + X_{9,10,1} + X_{7,10,9} + X_{9,10,7} + X_{2,10,8} + X_{8,10,2} + X_{3,10,8} + X_{8,10,3} + \\ + X_{3,10,5} + X_{5,10,3} + X_{4,10,6} + X_{6,10,4} ).$$

. 20,

20

	1	2	3	4	5	6	7	8	9	10	
1									2,8,10		
2								9,1,10			
3					7,4,10			9,7,10			
4						7,5,10					
5			7,4,10								
6				7,5,10							
7									8,3,10		
8		9,1,10	9,7,10								
9	2,8,10						8,3,10				
10											

. 21.

21

	$Q_{19}$	$Q_{28}$	$Q_{35}$	$Q_{38}$	$Q_{46}$	$Q_{53}$	$Q_{64}$	$Q_{79}$	$Q_{82}$	$Q_{83}$	$Q_{91}$	$Q_{97}$
	$Q_1$	$Q_2$	$Q_3$	$Q_4$	$Q_5$	$Q_6$	$Q_7$	$Q_8$	$Q_9$	$Q_{10}$	$Q_{11}$	$Q_{12}$

. 22 .

22

	$X_{19}^2$	$X_{19}^8$	$X_{19}^{10}$	$X_{28}^9$	$X_{28}^1$	$X_{28}^{10}$	$X_{35}^7$	$X_{35}^4$	$X_{35}^{10}$
	$X_{21}$	$X_{81}$	$X_{10,1}$	$X_{92}$	$X_{12}$	$X_{10,2}$	$X_{73}$	$X_{43}$	$X_{10,3}$

$X_{38}^9$	$X_{38}^7$	$X_{38}^{10}$	$X_{46}^7$	$X_{46}^5$	$X_{46}^{10}$	$X_{53}^7$	$X_{53}^4$	$X_{53}^{10}$	$X_{64}^7$	$X_{64}^5$	$X_{64}^{10}$	$X_{79}^8$	$X_{79}^3$
$X_{94}$	$X_{74}$	$X_{10,4}$	$X_{75}$	$X_{55}$	$X_{10,5}$	$X_{76}$	$X_{46}$	$X_{10,6}$	$X_{77}$	$X_{57}$	$X_{10,7}$	$X_{88}$	$X_{38}$

$X_{79}^{10}$	$X_{82}^9$	$X_{82}^1$	$X_{82}^{10}$	$X_{83}^9$	$X_{83}^7$	$X_{83}^{10}$	$X_{91}^2$	$X_{91}^8$	$X_{91}^{10}$	$X_{97}^8$	$X_{97}^3$	$X_{97}^{10}$
$X_{10,8}$	$X_{99}$	$X_{19}$	$X_{10,9}$	$X_{9,10}$	$X_{7,10}$	$X_{10,10}$	$X_{2,11}$	$X_{8,11}$	$X_{10,11}$	$X_{8,12}$	$X_{3,12}$	$X_{10,12}$

( . 23).

1, 2, 3, ..., 10,

$W_1', W_2', \dots, W_{10}'$ ,

-

$Q_{12}$ ,  $1, 2, \dots, 12$ ,  $Q_1, Q_2, \dots$ ,  
 $M = 900$ .

$$Q_\phi = \sum_{i=1}^{12} W_i^1 - \sum_{j=1}^{12} Q_j = 1140.$$

. 23 10 13 32

23

													$W_i$	
	1	2	3	4	5	6	7	8	9	10	11	12		
1		2							2				0	99
2	3										3		0	102
3								3				3	0	112
4			3			3							0	149
5					5		5						0	119
6													0	82
7			2	2	2	2	2			2			0	101
8	2							2			2	2	0	120
9		5		5					5	5			0	108
10	1	1	1	1	1	1	1	1	1	1	1	1	0	607
$Q_j$	3	6	3	10	3	6	4	4	4	7	5	6	1140	

. 24 25,

1, 4, 5, 6, 7, 9, 10      2, 3, 4, 5, 6, 7, 9, 10.

2, 3, 8, 10

1, 8, 11, 12.

25

. 24

24

										$W_i^1$
	2	3	4	5	6	7	9	10		
1	2						2		0	99
4		3			3				0	149
5				5		5			0	119
7		2	2	2	2	2		2	0	101
9	5		5				5	5	0	108
10	1	1	1	1	1	1	1	1	0	350
$Q_j$	6	3	10	3	6	4	4	7	883	926

25

						$W_i^1$
	1	8	11	12		
2	3		3		0	102
3		3		3	0	112
8	2	2	2	2	0	120
10	1	1	1	1	0	175
$Q_j$	3	4	5	6	491	509

1 2, . 24 25  
 . ,  
 . 24  
 1, 4, 5, 7, 9, 10 1, 2, 3, 4, 5, 6, 2, 3, 4,  
 5, 6, 7, 9, 10, 1, 2, 3, 4, 5, 6, 7, 8, 9. 1  
 ( . 26).

26

										$W_i^1$
	1	2	3	4	5	6	7	8	9	
1	2						2		0	99
2		3			3				0	149
3				5		5			0	119
4		2	2	2	2	2		2	0	101
5	5		5				5	5	0	108
6	1	1	1	1	1	1	1	1	0	350
$Q_j$	6	3	10	3	6	4	4	7	883	926

2 ( .25)

2, 3, 8, 10

1, 2, 3, 4,  
5.

1, 8, 11, 12,  
2

1, 2, 3, 4,

( .27).

27

						$W_i^1$
	1	2	3	4	5	
1	3		3		0	102
2		3		3	0	112
3	2	2	2	2	0	120
4	1	1	1	1	0	175
$Q_j$	3	4	5	6	491	509

. 28.

28

	$X_{10,2}$	$X_{10,3}$	$X_{10,4}$	$X_{10,5}$	$X_{10,6}$	$X_{10,7}$	$X_{10,9}$
	$X(6,1)$	$X(6,2)$	$X(6,3)$	$X(6,4)$	$X(6,5)$	$X(6,6)$	$X(6,7)$

$X_{10,10}$	$X_{10,1}$	$X_{10,8}$	$X_{10,11}$	$X_{10,12}$
$X(6,8)$	$X(4,1)$	$X(4,2)$	$X(4,3)$	$X(4,4)$

1

.29.

$Z = 29720, \quad Z = 43.$

29

	1	2	3	4	5	6	7	8	9	$W_i^1$
1	2						2		0	99
									99	
2		3			3				0	149
									149	
3				5		5			0	119
									119	
4		2	2	2	2	2		2	0	101
									101	101
5	5		5				5	5	0	108
									108	
6	1	1	1	1	1	1	1	1	0	350
	6	3	10	3	6	4	4	7	307	
$Q_j$	6	3	10	3	6	4	4	7		

2

. 30.

$Z = 9024, \quad Z = 18.$

30

	1	2	3	4	5	$W_i^1$
1	3		3		0	102
					102	
2		3		3	0	112
					112	
3	2	2	2	2	0	120
					120	
4	1	1	1	1	0	175
	3	4	5	6	157	
$Q_j$	3	4	5	6	491	



.22 28.

( )

1:

$$\begin{aligned}
X(6,1) &= X_{10,2} = X_{28}^{10} = 6, Z_{28}^{10} = 6, \\
X(6,2) &= X_{10,3} = X_{35}^{10} = 3, Z_{35}^{10} = 3, \\
X(1,9) &= X_{1\phi} = 99, \\
X(2,9) &= X_{5\phi} = 149, \\
X(3,9) &= X_{4\phi} = 119, \\
X(6,3) &= X_{10,4} = X_{38}^{10} = 10, Z_{38}^{10} = 10, \\
X(6,4) &= X_{10,5} = X_{46}^{10} = 3, Z_{46}^{10} = 3, \\
X(6,5) &= X_{10,6} = X_{53}^{10} = 6, Z_{53}^{10} = 6, \\
X(6,6) &= X_{10,7} = X_{64}^{10} = 4, Z_{64}^{10} = 4, \\
X(6,7) &= X_{10,9} = X_{82}^{10} = 4, Z_{82}^{10} = 4, \\
X(6,8) &= X_{10,10} = X_{83}^{10} = 7, Z_{83}^{10} = 7, \\
X(4,9) &= X_{7\phi} = 101, \\
X(5,9) &= X_{9\phi} = 108. \\
X(6,9) &= X_{10,} = 307 \\
Z_1 &= 43( \cdot ).
\end{aligned}$$

2:

$$\begin{aligned}
X(1,5) &= X_{2\phi} = 102, \\
X(2,5) &= X_{3\phi} = 112, \\
X(4,1) &= X_{10,1} = X_{19}^{10} = 3, Z_{19}^{10} = 3, \\
X(4,2) &= X_{10,8} = X_{79}^{10} = 4, Z_{79}^{10} = 4, \\
X(4,3) &= X_{10,11} = X_{91}^{10} = 5, Z_{91}^{10} = 5, \\
X(4,4) &= X_{10,12} = X_{97}^{10} = 6, Z_{97}^{10} = 6, \\
X(3,5) &= X_{8\phi} = 120. \\
X(4,5) &= X_{10,} = 157 \\
Z_2 &= 18( \cdot ).
\end{aligned}$$

:

$$\begin{aligned}
Z &= Z_1 + Z_2 = 43 + 18 = 61( \cdot ). \\
& ( \cdot .20)
\end{aligned}$$

.31.

31

				/	/
1	9	10	3	2 / 8	9 / 6
9	1	10	5	2 / 8	15 / 10
2	8	10	6	1 / 9	12 / 30
8	2	10	4	1 / 9	8 / 20
3	5	10	3	7 / 4	6 / 9
5	3	10	6	7 / 4	12 / 18
3	8	10	10	9 / 7	50 / 20
8	3	10	7	9 / 7	35 / 14
4	6	10	3	7 / 5	6 / 15
6	4	10	4	7 / 5	8 / 20
7	9	10	4	8 / 3	8 / 12
9	7	10	6	8 / 3	12 / 18

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61 . ,

181 / 192 . .

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122 . ,

61 . .

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2. , 1974.- 264 . , . , . . . ( . . . ) : . . . - : . . . , 2002.- 36 .