

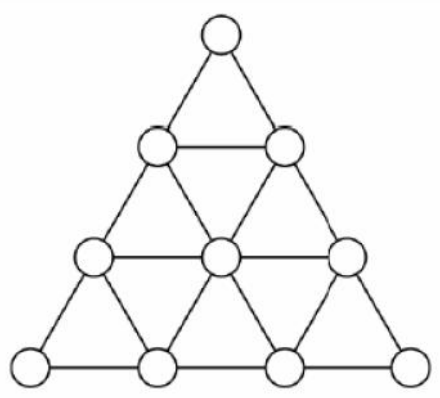


B  $100 - n$   
 A (  
 B,  $n$  )  
 (  $n+1$  ) - ,  
 A  $n-1$  -  
 n - ,  
 A  $n=0$  .  
 (  $100 - n < 100$  , )  
 n = 99 .  
 X  
 X, X -  
 Y X, X, Y  
 X, X, X 99  
 99 ,

2.  
 1 10 .

n

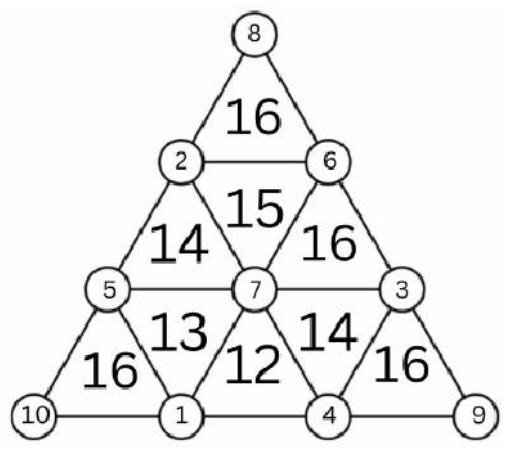
n.



...  $n = 48$ , ...

16).

$n \leq 48$  ( -  
 $n = 48$ , -  
 48.



$c$ .  $c \leq 7$ ,

( 9  
 $c \geq 9$ ,

$$1 + 2 + \dots + 10 - c = 55 - c \geq 48.$$

,  $c$  ).

$$1 + 2 + 3 + 4 + 5 + 6 + 3 \cdot c \geq 21 + 27 = 48.$$

$$c = 8.$$

$$55 - 8 = 47.$$

8.

8,

47,

48.

$$n = 48.$$

1, 2, ..., 9,

1,5,9. , -

47. -

1,5,9, x -

$55 - x \leq 4, \quad x \geq 8.$  , -

1,5,8; 1,6,9; 3,5,9, -

$y, z, t$

$y, z, t \geq 8.$  ,  $x, y, z, t$  ,

{8,9,10}, .

**3.**  $n$   $2020 \times n$ ,

1 -1.

$j$ - ,  $b_i$

$i$ - .  $n$

$a_1 + a_2 + \dots + a_{2020} + b_1 + \dots + b_n = 0.$

$2020 + n$  0

1 -1,  $2020 + n$  . ,  $n$

$a_1 \cdot a_2 \cdot \dots \cdot a_{2020} \quad b_1 \cdot b_2 \cdot \dots \cdot b_n$  -

.-

-1  $a_1, a_2, \dots, a_{2020}$

-1 ,

$b_1, b_2, \dots, b_n$ .

$1010 + \frac{n}{2}$ ,  $\frac{n}{2}$  , ..

$n$  4.  $n$ , 4, -

2020  $n$  , -

$n = 4k$  .  $a_1, a_2, \dots, a_{2020}, b_1, b_2, \dots, b_n$

$1010 + 2k$  -1.  $2, 3, \dots, 1011$ -

-1. ,

$2, 3, \dots, 2k + 1$  -1.

1.

$$a_1 = a_{1012} = \dots = a_{2020} = 1 \quad a_2 = a_3 = \dots = a_{1011} = -1.$$

$$b_1 = b_{2k+2} = \dots = b_{4k} = 1 \quad b_2 = b_3 = \dots = b_{2k+1} = -1. \quad ,$$

$$a_1 + a_2 + \dots + a_{2020} + b_1 + b_2 + \dots + b_n = 0.$$

4.

2022

,

$O$

1, 2, ..., 2022 .

-

:

•

$O$

,

•

$O$ ,

.

$k$ ,

1, 2, ...,  $k$  .

.  $n = 2022$ .

$n$

1, 2, ...,  $n$

1, 2, ...,  $k \quad k \geq 1$ .

$k < n$

$n$ .

$n$

$a \leq 0$ ,

$n$ .

$a > 0$ ,

$a \geq k + 1$ ,

1, 2, ...,  $k$  .

$a \geq k + 1$

$k + 1 - n$ .

$i$ ,

$k + 1 - n \leq i \leq 0$

$k + 1 \leq i \leq n$ .

$k$ .

1, 2, ...,  $k$

$k + 1$ .

$a > 0$ ,

$a - k$ ,

$2k + 1 \leq a \leq n$  .

$2k + 1 \leq n$

$a \leq 0$ ,

$k + 1 - n \leq a \leq 0$ .

$a + k$ ,

$a + k \leq 0$

$2k + 1 - n \leq a + k \leq 0$ .

$2k + 1 \leq n$ .

$k \leq \frac{n-1}{2} = 1010,5$ .

$k$  ,

$k \leq 1010$ .

$k = 1010$ .  $1, 2, \dots, k$ ,  
 $k + 1$ .  
 $k + 2 \quad 1,$   $k + 3 \quad 2.$   
 $i,$   
 $i = 4, \dots, k.$   $n = 2k + 2 = 2022.$   
 $1, 2, \dots, n$  .  
 $1, 2, \dots, k,$   $k = 1010.$   
 $k + 1 > k.$   $0$   
 $k + 1$   $k + i + 1,$   
 $i.$   $0,$   
 $k + i + 1 > k,$   $k + i + 1 - i = k + 1 > k.$   
 $k + 1,$   
 $k + 1 - (k + i + 1) = -i < 1,$   $-i + i = 0.$   
 $k + 1$   $0,$   
 $1, 2, \dots, k.$   
 $n = 2k + 2,$   $0 + (2k + 2) = 2k + 2 > k$   
 $k + 1 - (2k + 2) = -k - 1 < 1.$  ,  
 $1, 2, \dots, k,$   $k = 1010$  .  
**5.**  $g$   $c$  ,  
 $1, 2, \dots, c.$   
 $( \quad )$  .  
 $\frac{2c}{g}$  .  
 $i, (i = 1, 2, \dots, c)$  -  
 $i$  .  
 $2c$  -

$\frac{2c}{g}$  ,  $g -$   
 $\frac{2c}{g}$  .  
 $\cdot$   
 $\cdot$   
 $\cdot$   
 $x, w_x$   
 $x$   
 $\sum_x w_x \geq 2c ,$   
 $\frac{2c}{g} .$   
 $w_x,$  :  
 $0. i-$   $i$   
 $x y. w_x w_y$   
 $x y.$   
 $w_x = w_y$  1,  
 $w'_x = w_y + 1 \quad w'_y = w_x + 1.$   
 $w_x < w_y$   $i$  1  
 $x,$   
 $w'_x = w_y + 1 \geq (w_x + 1) + 1 = w_x + 2 \quad w'_y = w_y .$   
 $,$   $i,$  -  
 $2.$   $c$   
 $,$   $2c,$   
 $\cdot$   
**6.**  $\cdot$  -  
 $,$  10  
 $10$   $\cdot$   
 $\cdot$  ?  
 $\cdot$   $A, B, C$   
 $a, b, c$  ,  $\cdot$   
 $,$   $\cdot$   
 $:$   
 $,$

$(x \in A, y \in B)$   
 $10 \quad z \in C$   
 $\overline{xz} \quad \overline{yz}$   
 $10ab \quad 10bc \quad 10ca$   
 $a = b = c$   
 $10a^2$   
 $x \in A, y \in B$   
 $\overline{xz} \quad \overline{yz}$   
 $\overline{yx} \quad \overline{zx}$   
 $\overline{xy} \quad \overline{zy}$   
 $10a^2$   
 $10a^2$   
 $30a^2$   
 $a^3 = 10^2 + 30a^2, \quad a = 40$   
 $120$   
 $A, B, C$   
 $a, b, c$   
 $x \in A, y \in B$   
 $B \cap C(x) \cap C(y)$   
 $|C(x) \cap C(y)| = 10 \quad |C| - |C(x) \cup C(y)| = 10$   
 $|C(x)| + |C(y)| = |C(x) \cup C(y)| - |C(x) \cap C(y)| = |C| - 10 + 10 = c$   
 $x' \in A$   
 $|C(x')| + |C(y)| = c$   
 $|C(x)| = |C(x')|$   
 $C \cap A$   
 $d_{AC}$



$A \quad B,$

$$\begin{cases} d_{BA} + d_{CA} = a \\ d_{CB} + d_{AB} = b. \\ d_{AC} + d_{BC} = c \end{cases}$$

$A \quad B.$

$A$

$a$

$A$  ,  $B$  ,

$$a \cdot d_{AB} \cdot d_{AC} = b \cdot d_{BA} \cdot d_{BC},$$

$$a \cdot d_{AB} = b \cdot d_{BA}.$$

$$\begin{cases} \frac{a}{b} \cdot d_{AB} + d_{CA} = a \\ \frac{b}{c} \cdot d_{BC} + d_{AB} = b. \\ \frac{c}{a} \cdot d_{CA} + d_{BA} = c \end{cases}$$

$$d_{CA} = \frac{1}{2}a, \quad d_{AB} = \frac{1}{2}b, \quad d_{BC} = \frac{1}{2}c.$$

$(x, y, z)$

$x \in A, y \in B \quad z \in C \quad x \quad y \quad z.$

$$a \cdot d_{AB} \cdot d_{AC} = b \cdot c \cdot 10.$$

$$d_{AB} = \frac{1}{2}b, \quad d_{AC} = \frac{1}{2}c,$$

$a = 40.$

$b = 40 \quad c = 40,$

120.