Олимпиада ЮМШ 2020-21 года

Код участника: 8050

Лист подготовки устного ответа

Лист № 1

Фиксация санитарных выходов:

1 выход:		возвращение:	
2 выход:		возвращение:	
3 выход:		возвращение:	
4 выход:		возвращение:	
5 выход:		возвращение:	

Время окончания:

Всего листов:

$n = p_1^{\alpha_1} p_2^{\alpha_2} \dots$

$(\alpha_1+1)(\alpha_2+1)\dots$

$n = p^5$ или $n = p_1 p_2^2$

$1 \quad p \quad p^2 \quad p^3 \quad p^4 \quad n$

$p(p-1) > p^4 - p^3 = p^3(p-1)$

$p > p^3$

$p_1 \quad p_2 \quad p_1 p_2 \quad p_2^2 \quad n$

$1 \quad p_1 \quad p_2 \quad p_1 p_2 \quad p_2^2 \quad n$

$1 \quad p_2 \quad p_2^2 \quad p_1 p_2 \quad p_1 \quad n$

$p_2^2 < p_1$

$p_2(p_2-1) > p_1(p_2-1)$

$p_2 > p_1$

$n = ad = bc$

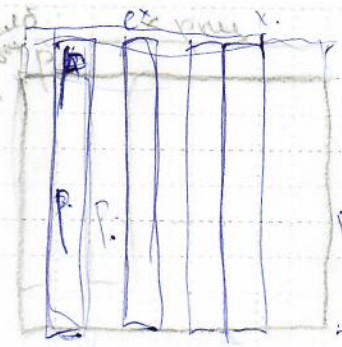
$a = \frac{n}{d} \quad b = \frac{n}{c}$

$\frac{n}{c} - \frac{n}{d} > d - c$

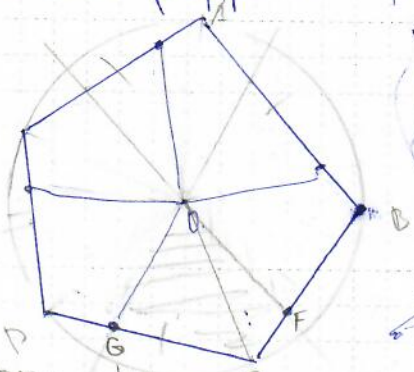
$n\left(\frac{d-c}{dc}\right) > d - c$

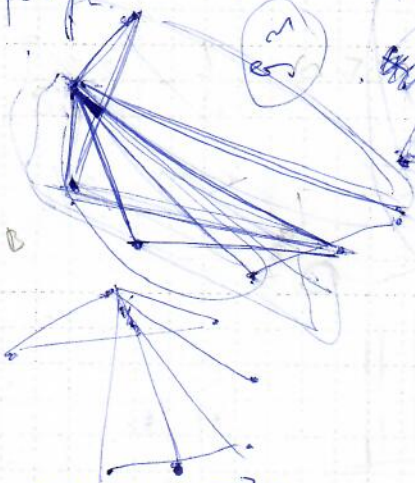
$\frac{n}{dc} > 1$

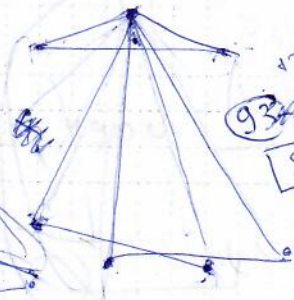
$n = bc \quad d > b \Rightarrow dc > bc = n$



$x + y + z + \dots = 70$







$95 + 95 + 95$

$\frac{a_1}{x+a_1} = \frac{a_2}{x+a_2}$

$(x+3)(96-x)$.

$\frac{a_1}{x+b_1} = \frac{a_2}{x+b_2}$

$a_2 x + b_1 a_2 = a_1 x + b_2 a_1$

$(a_2 - a_1)x = b_2 a_1 - b_1 a_2$

$x = \frac{b_2 a_1 - b_1 a_2}{a_2 - a_1}$

$b_2 = b_1 + c$. $\frac{ca_1}{a_2 - a_1}$ - целое

$(b_2 - b_1) a_1 \vdots a_2 - a_1$

$x + y + z + \dots = 70$

кол-во нечет. ч.

x^2 рац.

$x_1 + x_2 + \dots + x_n = 70$

$x_1^2 + x_2^2 + \dots + x_n^2 = 2021$

$a_1 x + a_1 a_2 + a_1 z = a_2 x + a_1 a_2 + a_2 z$ $(a_1 - a_2)x = (a_2 - a_1)z$

$b_2 - b_1 = a_2 - a_1$

$b_3 - b_2 = a_3 - a_2$

$x^2 + y^2 + \dots = 2021$

$70 - x - y$

$70 - x$

Код участника: 8050

Лист подготовки ответа

Лист № 2

$y = \frac{a_i}{x+b_i}$ $\quad \frac{a_1}{b_1+x} = \frac{a_2}{b_2+x}$ $\quad a_2b_1 + a_2x = b_2a_1 + a_1x.$ $\quad b_1 = b_2 + c$

$a_i = d\,x^{?}$

$a_2b_1 - b_2a_1 = x(a_1-a_2) \Rightarrow x = \frac{a_2b_1-b_2a_1}{a_1-a_2}$

$dy = dx$

$(b_i-b_j)dy \vdots d(x-y)$ $\quad \boxed{b_i-b_j \vdots x-y}$ $\quad \frac{(b_i-b_j)a_j}{a_i-a_j}$ $\quad \frac{(b_1-b_2)a_2}{a_1-a_2}$ $\quad \frac{b_2(a_2-a_1)+ca_2}{a_1-a_2}$

$\frac{a_jb_i-a_ib_j}{a_i-a_j} \vdots a_i-a_j$ $\quad y+b_i = a_i$ $\quad (b_i-b_j)a_j \vdots a_i-a_j$

$a_1b_2-a_2b_1 \vdots a_2-a_1$ $\quad y = \frac{a_j}{b_j+x}$ $\quad \frac{a_jx}{b_j+x}+b_iy=a_i$ $\quad (b_1-b_2)a_2 \vdots a_1-a_2$

$a_2b_3-a_3b_2 \vdots a_3-a_2$ $\quad \frac{a_i}{b_i+x} = \frac{a_j}{b_j+x}$ $\quad (b_2-b_3)a_2 \vdots a_3-a_2$

$a_ib_j + a_ix = a_jb_i + a_jx$

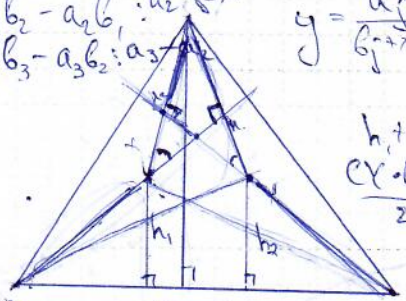
$x(a_i-a_j) = a_jb_i - a_ib_j$

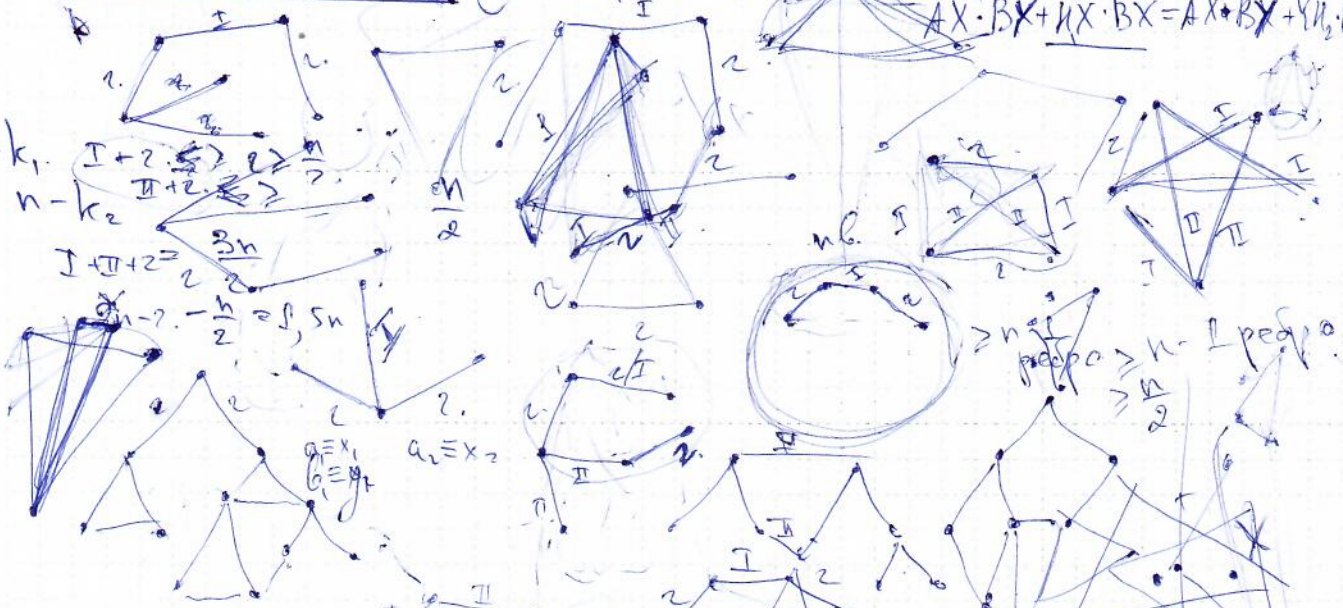
$x = \frac{a_jb_i-a_ib_j}{a_i-a_j}$

$h_1+h_2 < H$

$\frac{CY\cdot BH_2}{2}$ $\quad \frac{H\cdot AC}{2} > \frac{h_1\cdot AC}{2} + \frac{h_2\cdot AC}{2}$

$XH_1\cdot BY = YH_2\cdot BX$ $\quad AH_1\cdot BX = AX\cdot BX + H_1X\cdot BX = AX\cdot BX + YH_2\cdot BX$





$n-k_1$ $\quad I+2 \le n-1$ $\quad 2 \ge \frac{n}{2}$

$n-k_2$ $\quad II+2 \le n-1$

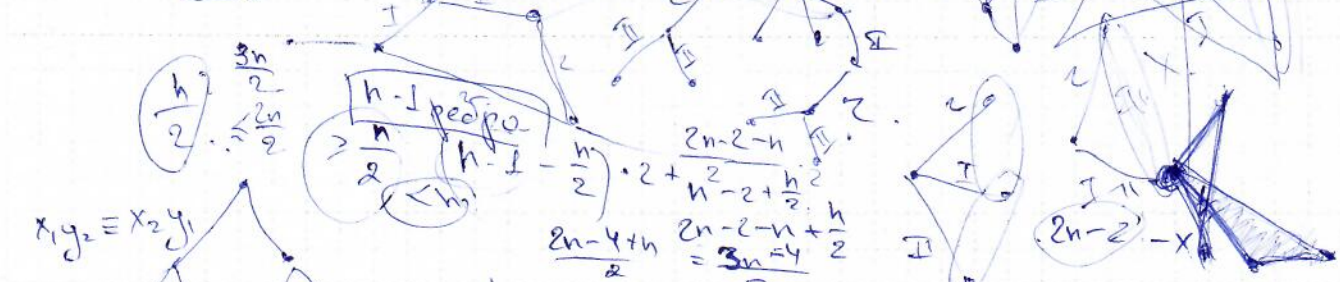
$I+II+2 = \frac{3n}{2}$

$\frac{n}{2}$ $\quad$ nb. $\quad$ $\ge n-1$ ребро $\ge n-1$ ребро $\ge \frac{n}{2}$

$a_1-? - \frac{n}{2} = 1,5n$

$a_1 \equiv x_1$ $\quad a_2 \equiv x_2$

$b_1 \equiv y_1$

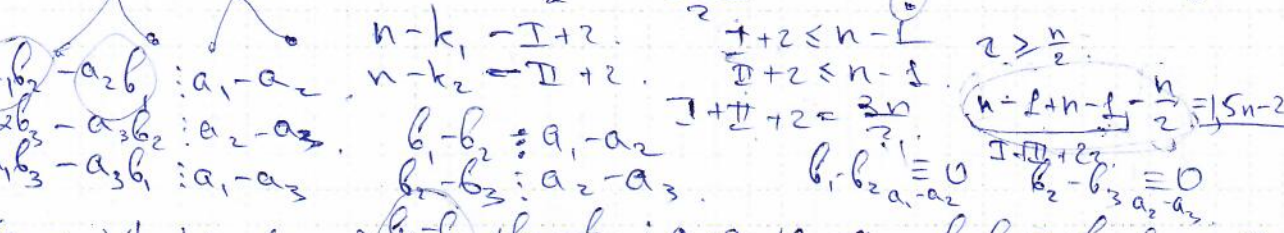


$\frac{3n}{2}$ $\quad \frac{h}{2} \le \frac{2n}{2}$ $\quad \boxed{n-1 \text{ ребро}}$ $\quad \ge \frac{n}{2}$ $\quad (n-1-\frac{n}{2})\cdot 2 + \frac{2n-2-n}{2}$

$(<n)$ $\quad n-2+\frac{n}{2}$

$\frac{2n-4+n}{2}$ $\quad \frac{2n-2-n+\frac{n}{2}}{2} = \frac{3n-4}{2}$ $\quad 2n-2 - x$

$x_1y_2 \equiv x_2y_1$



$a_1b_2 - a_2b \vdots a_1-a_2$ $\quad n-k_1 - I+2$ $\quad I+2 \le n-1$ $\quad 2 \ge \frac{n}{2}$

$a_2b_3 - a_3b_2 \vdots a_2-a_3$ $\quad n-k_2 - II+2$ $\quad II+2 \le n-1$ $\quad n-1+n-1-\frac{n}{2} = 1,5n-2$

$a_1b_3 - a_3b_1 \vdots a_1-a_3$ $\quad b_1-b_2 \vdots a_1-a_2$ $\quad I+II+2 = \frac{3n}{2}$

$b_2-b_3 \vdots a_2-a_3$ $\quad I+II+2$

$b_1-b_2 \equiv 0 \; a_1-a_2$ $\quad b_2-b_3 \equiv 0 \; a_2-a_3$

$(a_1-a_2)(k_1-k) = (a_2-a_3)(k-k_2)$ $\quad b_1-b_2+b_2-b_3 \vdots a_1-a_2+a_2-a_3$ $\quad b_1-b_2+b_2-b_3 \equiv 0$

$\frac{CY\cdot BH_2}{2} + \frac{BX\cdot BH_1}{2}$ $\quad (a_1-a_2)\cdot k_1 + (a_2-a_3)\cdot k_2 = (a_1-a_2)\cdot k + (a_2-a_3)\cdot k$ $\quad a_1-a_2+a_2-a_3$

Код участника: 8050

Лист подготовки ответа

Лист № 3

$\forall a_i b_j - a_j b_i \vdots a_i - a_j$

$(5-3)\cdot 2 \vdots 4-2$ 2

$b_1\ b_2\ b_1\ b_2\ b_1$

$(7-3)\cdot 4 \vdots 12-4$ 3

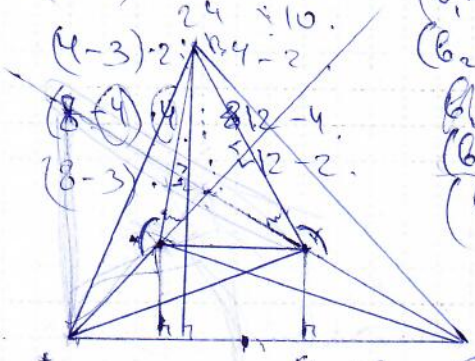
$(7-5)\cdot 12 \vdots 12-2$

$24 \vdots 10$

$(4-3)\cdot 2 \vdots 4-2$

$(8-4)\cdot 4 \vdots 12-4$

$(8-3)\cdot 2 \vdots 12-2$

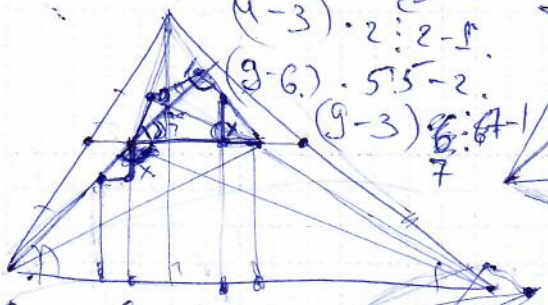


$(4-3)\cdot 2 \vdots 2-1$

$(9-6)\cdot 5 \vdots 5-2$

$(9-3)\cdot 6 \vdots 7-1$

7



$a_1b_1 - a_1b_2 \equiv ka_1 - ka_2$

$a_1(b_1-k) = a_1b_2 - ka_2$

$(b_2-b_1)a_1 \vdots a_1-a_2$

$(b_3-b_1)a_1 \vdots a_1-a_3$

$(b_2-b_3)a_1 \vdots$

$b_1-b_2 = k - k\frac{a_1}{a_2}$

$b_1-b_2 = k\left(\frac{a_1-a_2}{a_2}\right)$

$\boxed{(b_j-b_i)\cdot a_i} \vdots a_i-a_j$

$b_j-b_i \vdots e-e$

$a_i = ed$

$a_j = ed$

$\frac{a_i}{\lambda+e} = \frac{a_j}{}$

$a_i b_j - a_j b_i \vdots a_i - a_j$

$(b_1-b_2)\cdot a_2 \vdots a_1-a_2$

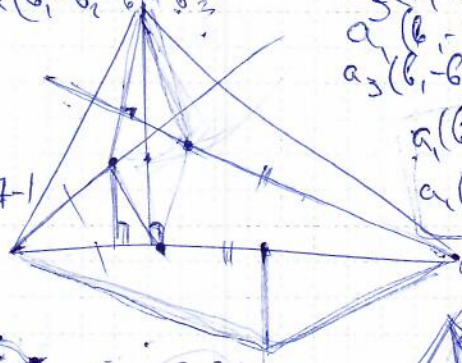
$(b_2-b_3)\cdot a_2 \vdots a_2-a_3$

$(b_1-b_3)\cdot a_3 \vdots a_3-a_1$

$(b_1-b_2) \neq 0$

a_1-a_2

$a(b_1-b_2-b_1+b_3)$



$(b_j-b_i)\cdot a_j \vdots a_i-a_j$

$a_i b_j - a_j b_i + a_i b_i - a_i b_x = a_i b_j - a_j b_x$

$\vdots a_i-a_j \qquad \vdots a_i-a_x$

$(b_1-b_2)\cdot a_2 \vdots a_1-a_2$

$(b_2-b_3)\cdot a_3 \vdots a_2-a_3$

$(b_3-b_1)\cdot a_1 \vdots a_1-a_3$

$a_2(b_1-b_3) \vdots$

$a_3(b_1-b_3) \vdots a_1-a_3$

$a_1(b_1-b_3) \vdots a_1-a_3$

$a_3(b_1-b_3) = k(a_1-a_2) + k(a_2-a_3)$

$a_1(b_1-b_2) \vdots a_1-a_2$

$a_1(b_1-b_3) \vdots a_1-a_3$

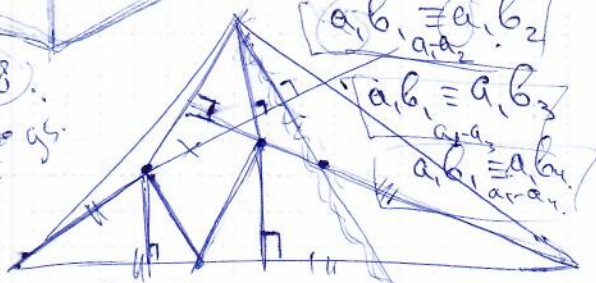
$a_1b_1 - a_1b_2 \vdots a_1-a_2$

$\boxed{a_1b_1 \equiv a_1b_2}_{a_1-a_2}$

$\boxed{a_1b_1 \equiv a_1b_3}_{a_1-a_3}$

$\boxed{a_1b_1 \equiv a_1b_4}_{a_1-a_4}$

98



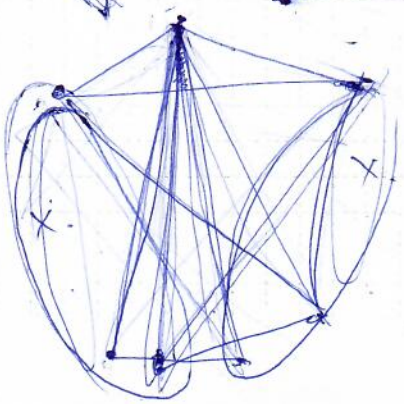
$b_1 \equiv b_2$

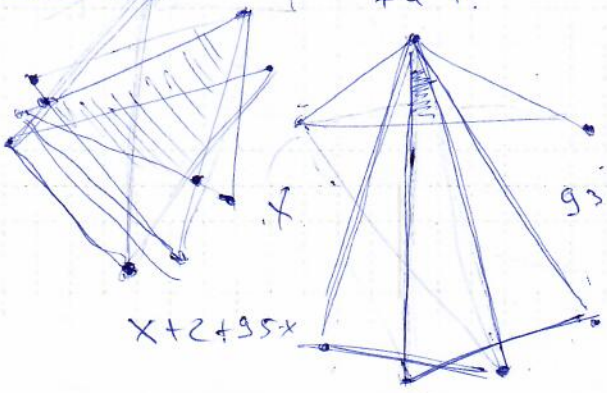
$6\cdot 5 \equiv 6\cdot 3$

$25+5 \equiv 15$

$b_1-b_2 = a_1-a_2$

$7\cdot 5 \equiv 7\cdot 7 + 4$





x

x

x

$93-x$

$x+2+95-x$